No. 1828
Vol. XLV

1/-

FLIGHT

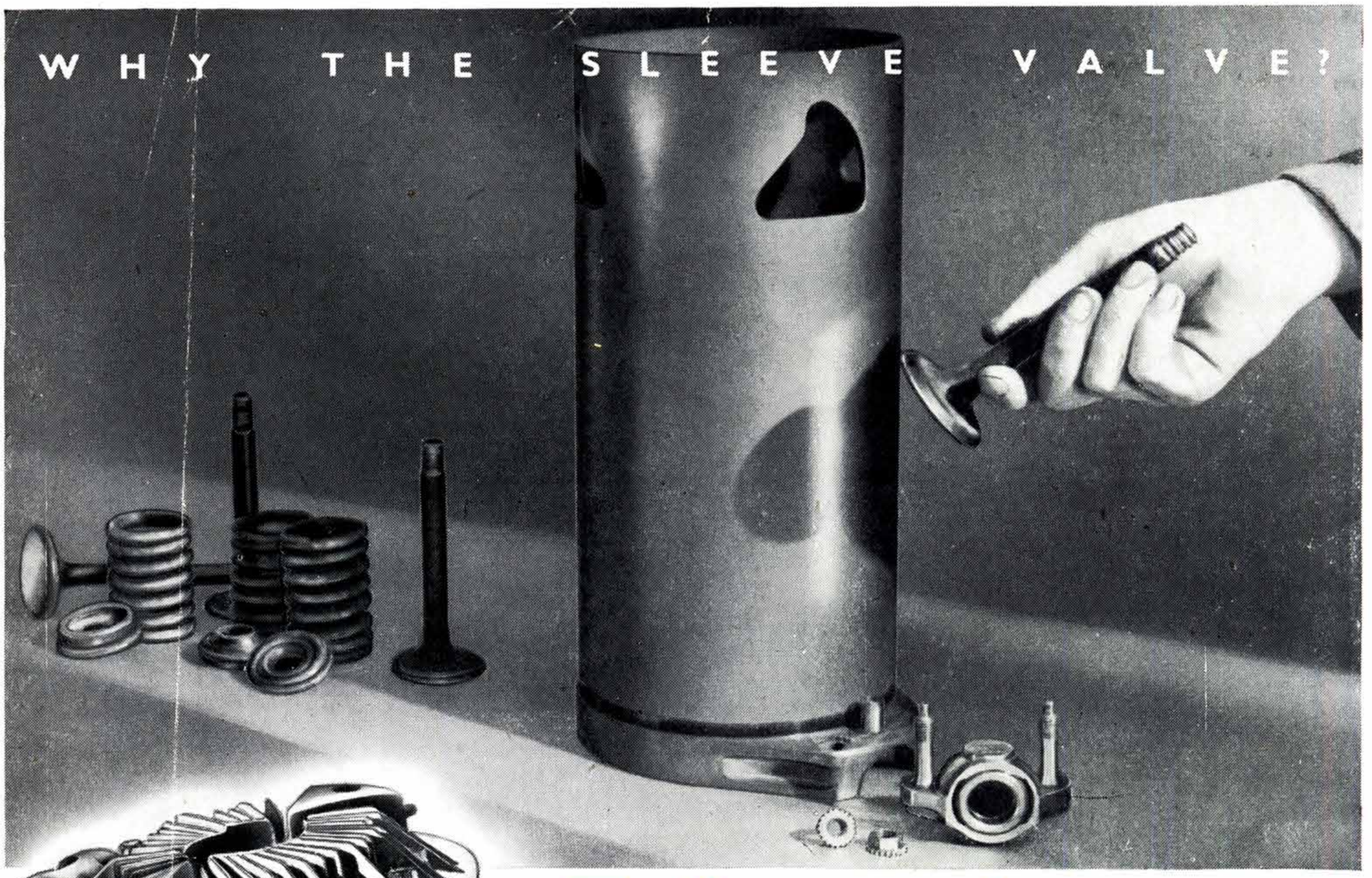
and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

JANUARY 6th, 1944

FLIGHT

JANUARY 6TH, 1944



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FLIGHT,
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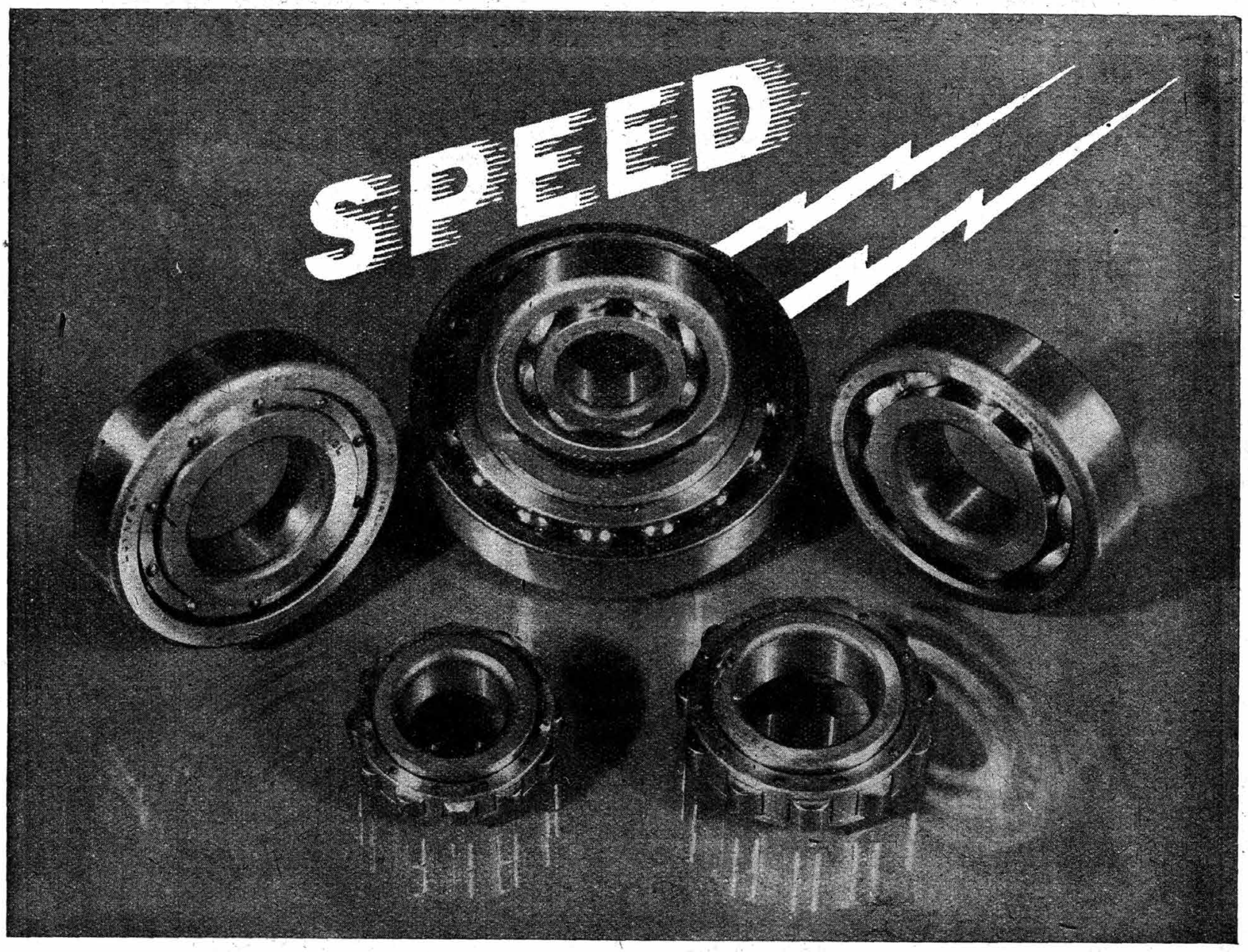

— the demand of to-day's war effort

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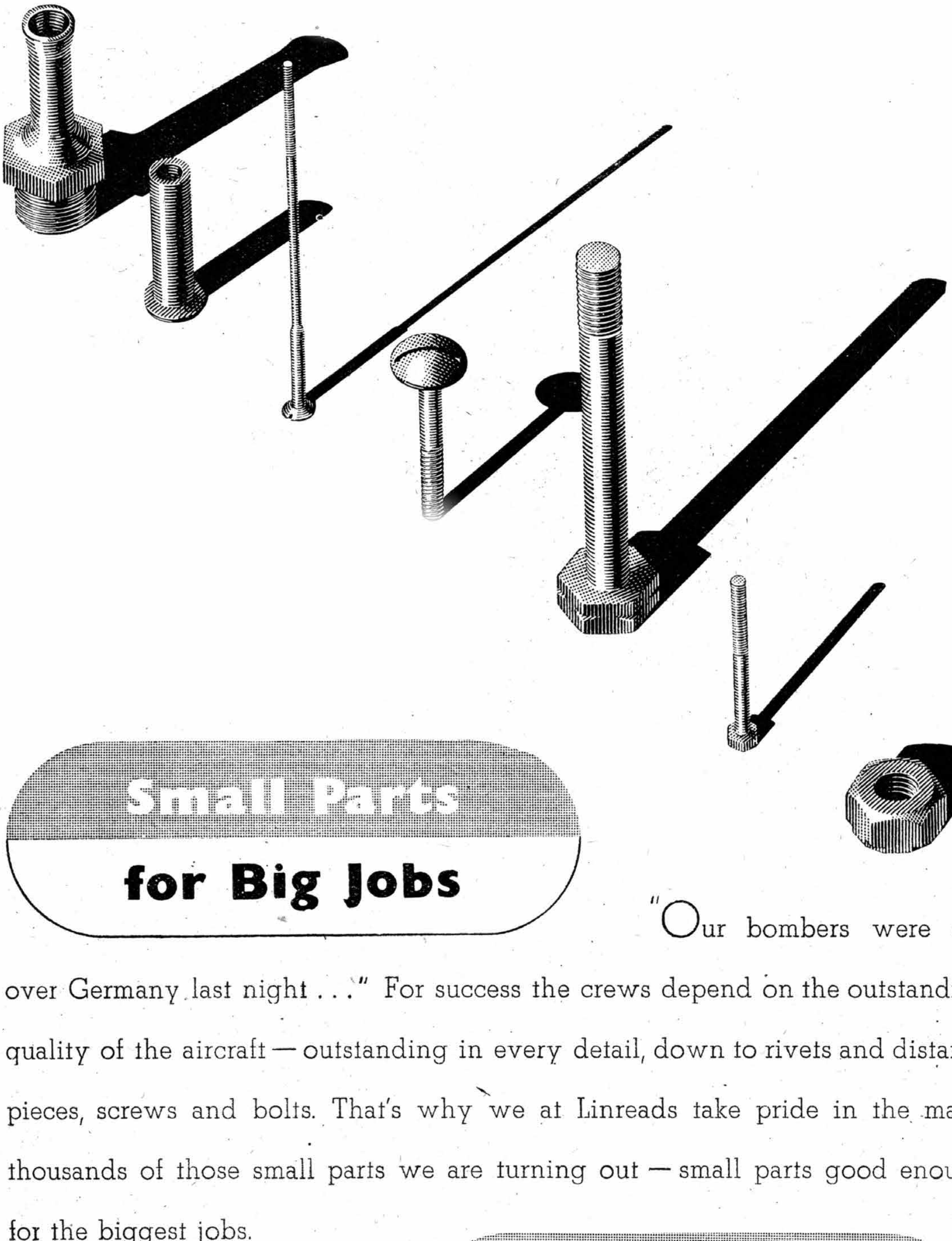

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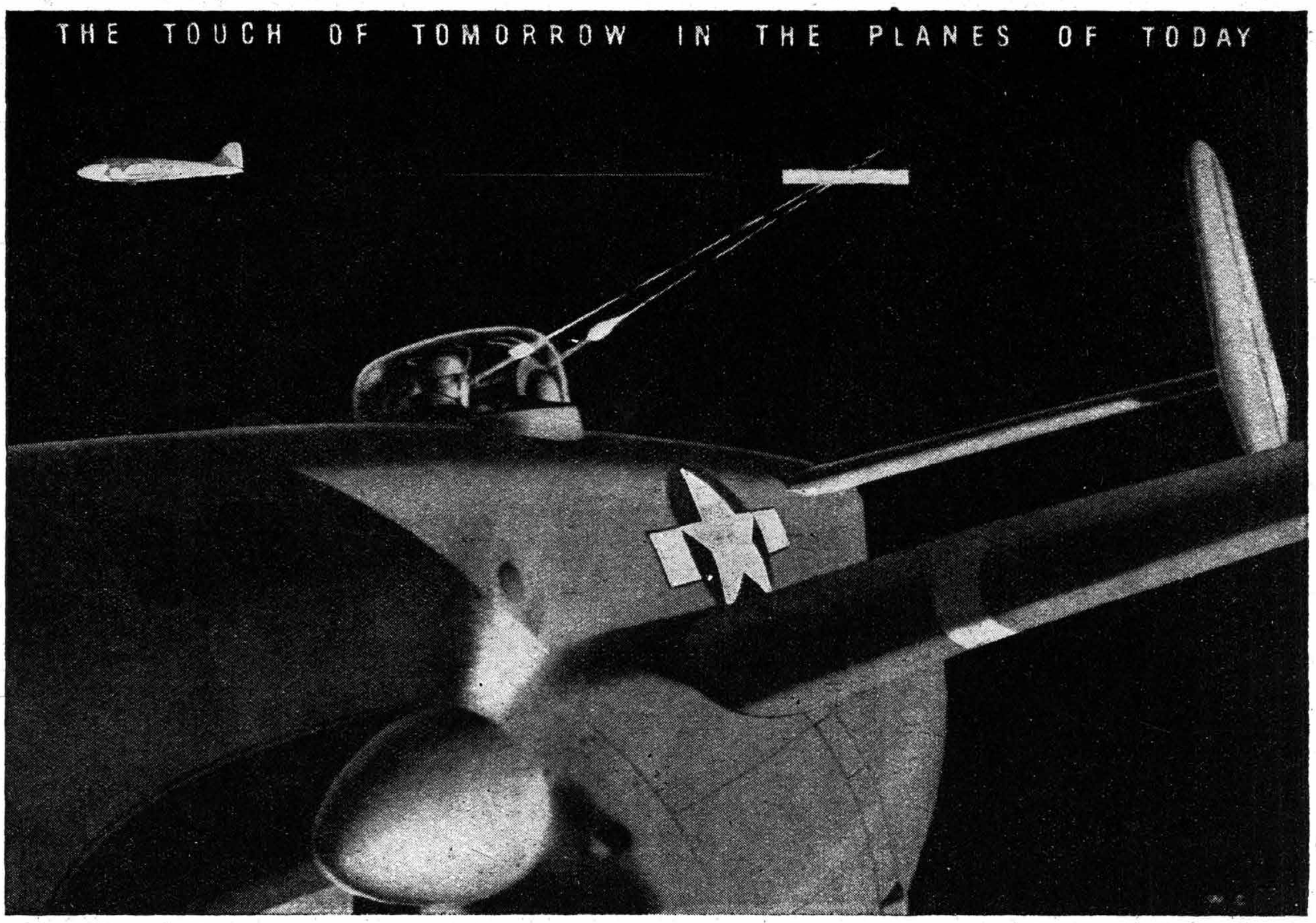

It All Adds Up To Subtracting Zeros

Today's apprentice gunner enters a deadly trade—defending American bombers against vicious attacks of Jap Zeros and other heavily armed enemy fighters.

To follow his trade and survive, the gunner first has to learn how to "polish 'em off around the clock." His training must be thorough and painstaking, and it must come within a hair's breadth of being the real thing. That's why Fairchild developed the GUNNER.

This advanced trainer has the essential characteristics of the bombers from which our student marksmen will soon shoot it out with Axis pursuits. From a power turret, similar to one on a Flying Fortress, each fledgling is taught to pick off tiny targets while moving at better than 200 miles per hour. It's fast, tricky work and it takes a keen eye, steady nerves, precision equipment. It's the kind of training that pays off when the chips are down.

Fairchild's GUNNER, from which apprentice marksmen step into bombers and thence into action, is one of the largest, speediest training planes used by the Army Air Forces. Powered by two 12-cylinder, inverted, in-line, air-cooled Ranger engines, the GUNNER is a typical example of Fairchild's "touch of tomorrow in the planes of today."

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FLIGHT,
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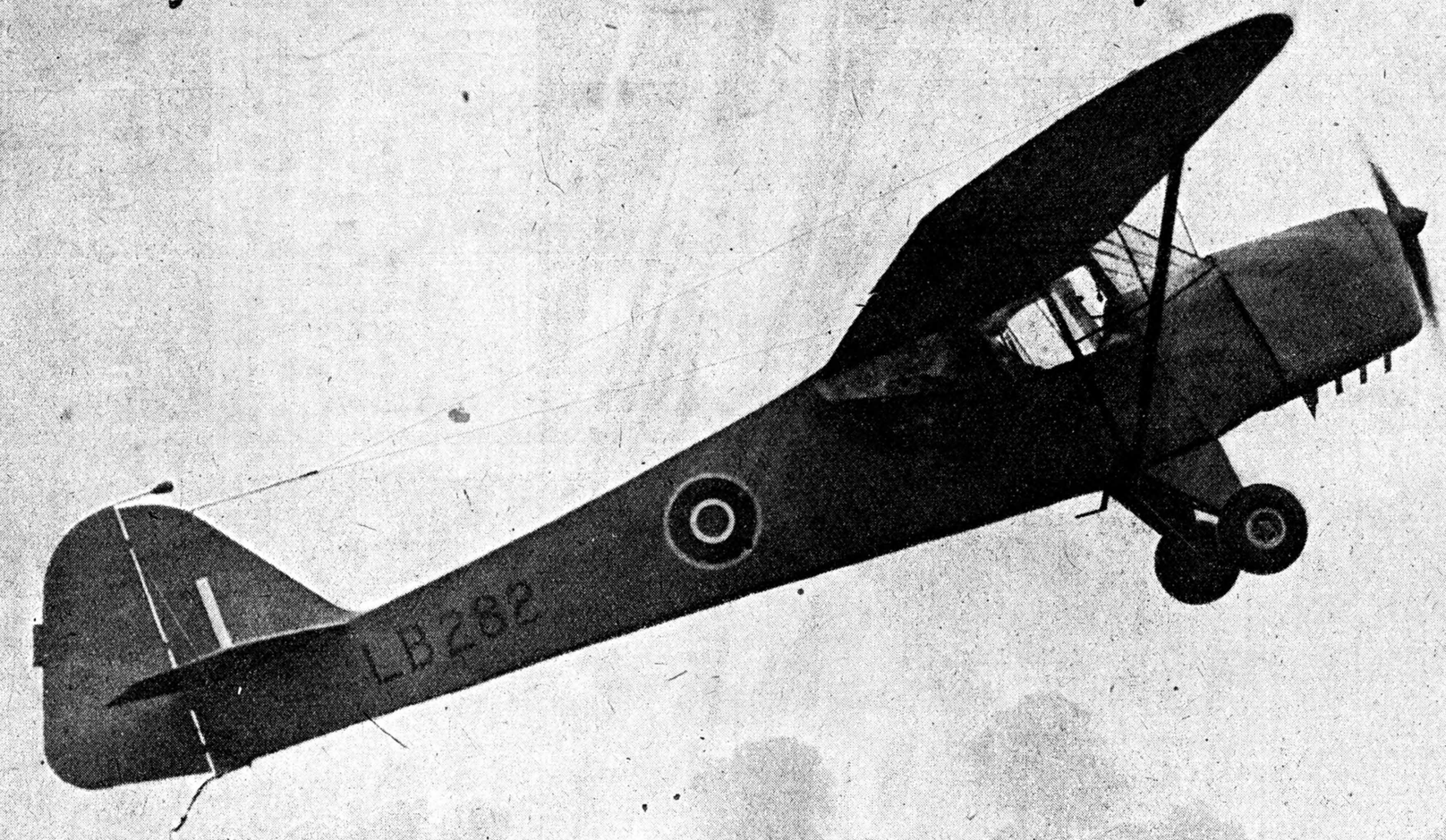
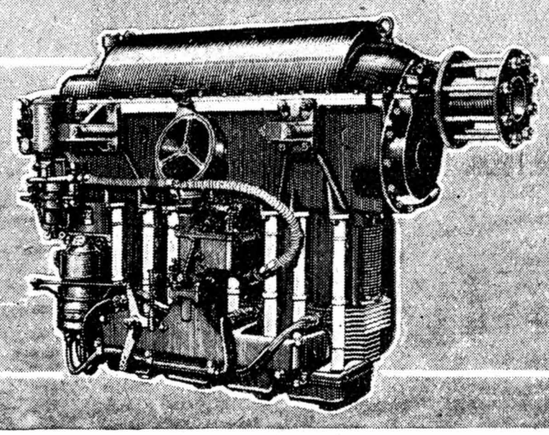
1944.
Advt. 11

The eyes of the Artillery

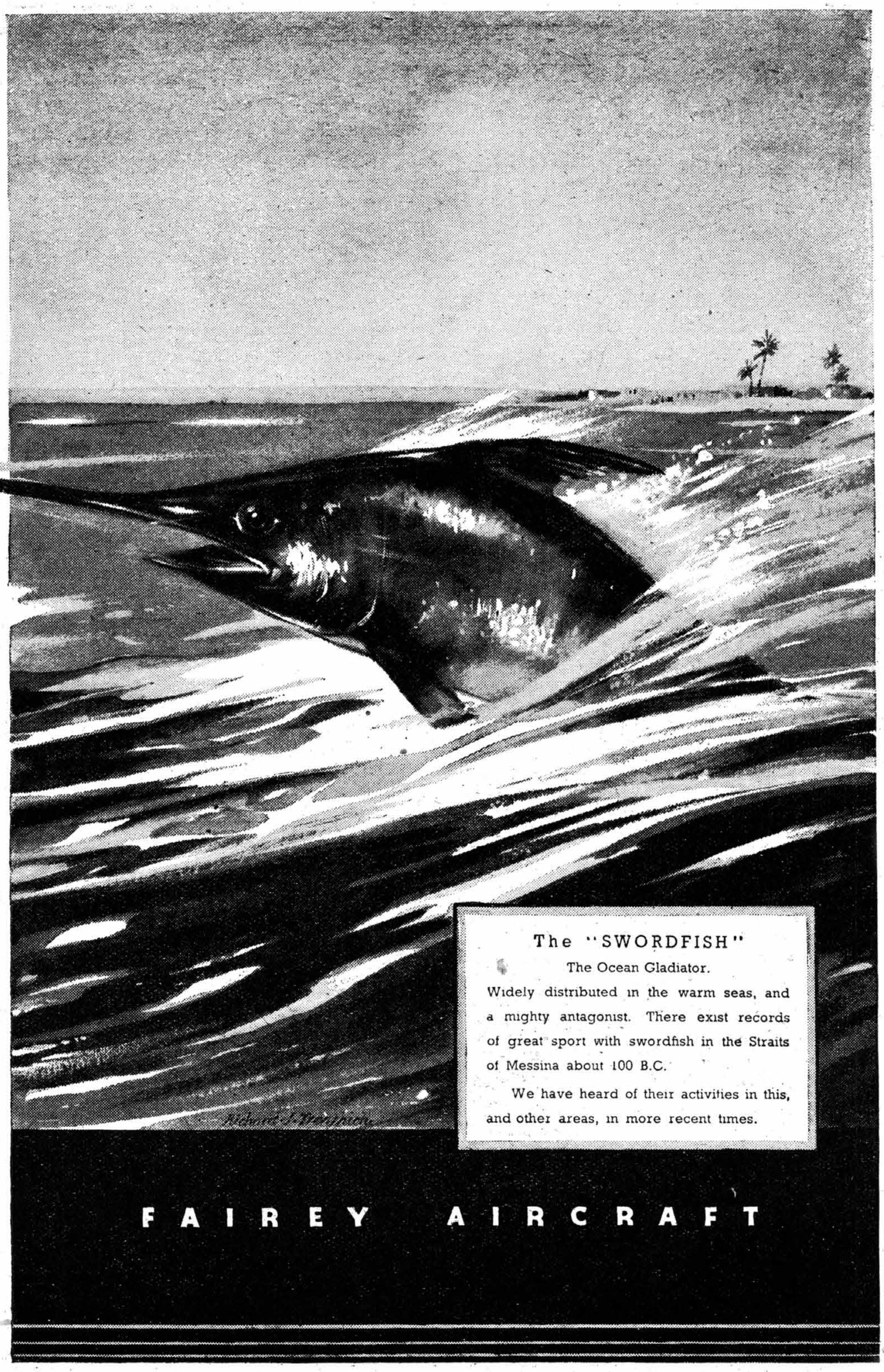




WITH THE

CIRRUS MINOR 90 HP

THROUGH FRANCE – LIBYA – TUNISIA


The "SWORDFISH"
The Ocean Gladiator.
Widely distributed in the warm seas, and a mighty antagonist. There exist records of great sport with swordfish in the Straits of Messina about 100 B.C.
We have heard of their activities in this, and other areas, in more recent times.
FAIREY AIRCRAFT

FLIGHT
and
The AIRCRAFT ENGINEER

First Aeronautical Weekly in the World : Founded 1909

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The Outlook

The Deputy Supreme Commander

IT would be an overstatement to say that the appointment of Air Chief Marshal Sir Arthur Tedder as Deputy Supreme Commander to General Eisenhower of the Allied Expeditionary Forces now being organised for the liberation of Europe is a new or revolutionary step, but it is a new application of a principle which has been in operation for some time past.

That principle is a novelty evolved in this war, namely, that all three Services, naval, land, and of the air, must work as one under a single Commander-in-Chief. Obviously the chosen man must belong to one of the three Services, and presumably he must know more about how to use the forces of his own Service than he can know about the handling of the other Services. But he must have knowledge of what the other two can do and the ability to plan so that each of the three can, and will, exert its maximum effect in the combined operations against the enemy. One may compare his position with that of a General Officer in the Army. The latter originally belonged to either the infantry, cavalry, artillery or engineers; yet if he is to command an Army he must be able to handle all those four branches in unison.

General Wavell was the first Allied officer to be made a Commander-in-Chief with power over all three Services in his area, and since then there have been a number of others. Most of them have been soldiers, with a few sailors here and there, as in Ceylon. Clearly the time must, and would, come when an Air Officer would be chosen for such a post. We may recall that before the war Air Chief Marshal Sir Robert Brooke-Popham was made Commander-in-Chief of the Far East. No new principle is involved in choosing an Air Officer; it was only a case of waiting until the youngest Service threw up someone who was the best man for the post. In the present circumstances Sir Arthur Tedder has proved himself fit to be Deputy to General Eisenhower, and if, unfortunately, the latter were to be incapacitated, this Air Chief Marshal will become Supreme Commander of all the naval, land and air forces of the Allies in the liberation of Europe.

By education, study and in practice, Sir Arthur Tedder has proved himself suitable to command all three—did he not when an undergraduate at Cambridge win a prize for a brilliant essay on "The Navy of the Restoration"? There is no fear that he will overlook the vital part which sea power must play in the war, right up to its closing stages; while his experience of working with a victorious Army has set up a model which has already been copied in other Commands and will be studied by future members of staff colleges and by the Committee of Imperial Defence.

Sir Arthur Tedder is the first Air Officer to be entrusted with such wide responsibilities in time of war, but as time goes on there is no doubt that others of his Service will follow in his footsteps.

General Montgomery's Maxims

IN Africa was first evolved the method by which an Army and an Air Force can work together up to final victory, and every student of war must be grateful to General Montgomery for making a frank statement of the principles on which this happy *modus operandi* was based. "We never," he said, "fought a land battle until the air battle was won. That is the first great principle of war."

There have been futile discussions of late in various quarters as to which is the "primary" arm in war.

The word "primary" has two meanings, implying either the first place in importance or the first place in time. General Montgomery explained that you must win the battle of the air first before you undertake the battle of the ground. The General made no rash statement as to which was the most important of all arms, for by this time everybody ought to know that all major arms appropriate to the campaign in question must be present in adequate strength.

The General, likewise, did not say what he thought would be the ideal organisation. He expressed no opinion as to whether the Army chiefs ought to command the Air Forces which work with them; he merely stated the fact that the Army does not command the air. He insisted as strongly as possible that the two must work as one. "Army co-operation means nothing," he said; "we do not understand it. When you are an entity you cannot co-operate." That the Army and the Air Force had become one in Africa was among the chief reasons for the Eighth Army's brilliant success. In the Tunisian campaign and afterwards General Eisenhower did command the air, but it was not because he was an Army Officer, but because he was Allied Commander-in-Chief with supreme powers over all the three Services as well as over all the Allies. The possibility lies ahead that in the invasion of Europe Air Chief Marshal Tedder may command Armies and Navies, again not because he is an Air Officer, but because he is Deputy Supreme Commander.

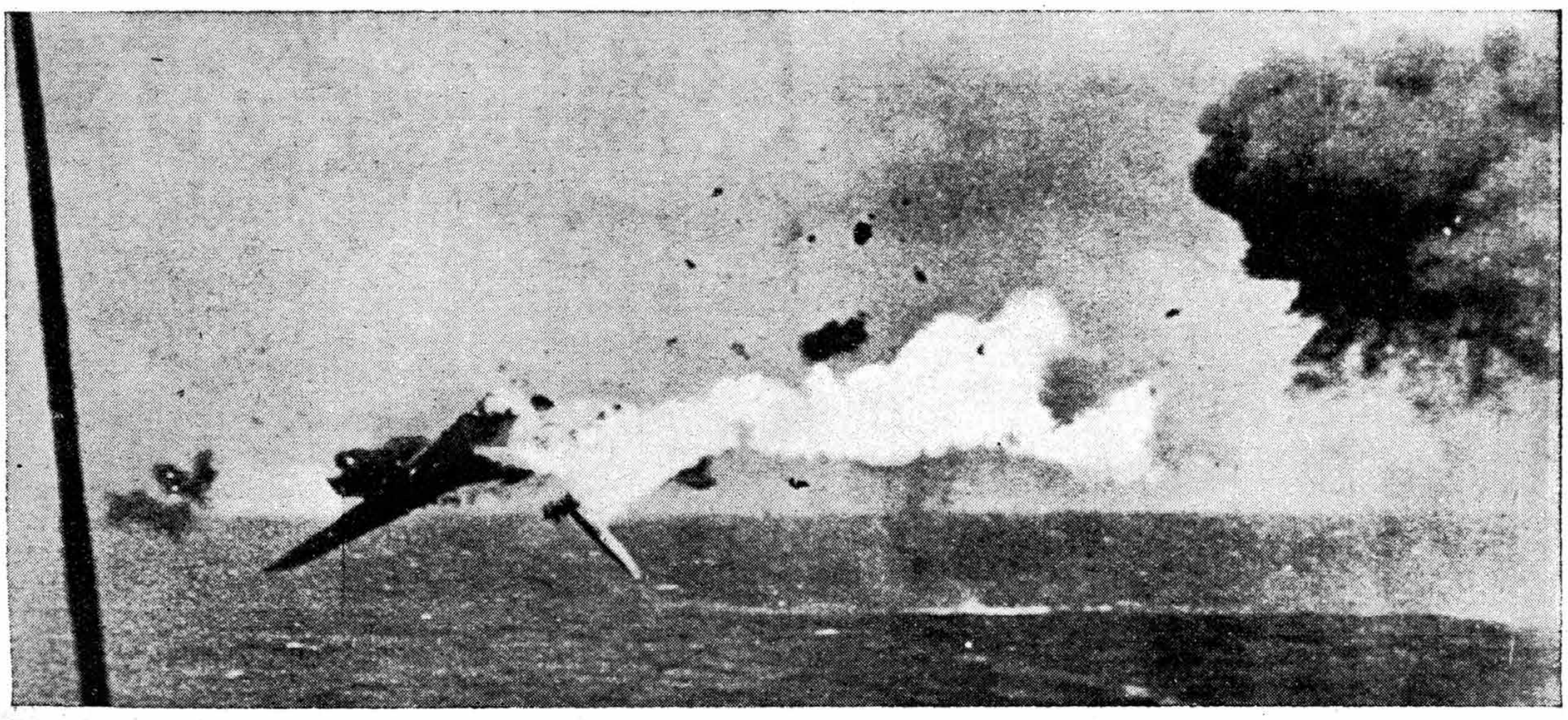
Things being as they are, General Montgomery laid great stress on the need for "complete mutual confidence and trust" between the Army and Air commanders. Here it is possible that the General laid his finger on the weak point in the present organisation. There have been bad-tempered Generals, and testy Air Marshals have not been unknown. If the two commanders did not get on well together, then General Montgomery's scheme would be in danger of failing. It has been reported that Rommel and Kesselring, for example, did not feel mutual trust and confidence when they commanded the German Army and *Luftwaffe* respectively in Libya. There has always been mutual trust in the Middle East ever since the days when General Wavell and Air Chief Marshal Longmore shared the same house in Cairo; but that happy state of affairs may not always obtain. If it does not, then it is a good thing that one should be able, as Marshal Foch said when appointed Generalissimo, *donner des ordres*. However, that eventuality was presumably provided for when the Prime Minister laid it down that in the Middle East the Air commander must do his utmost to carry out the plan of the Army commander. That practically provides for the giving of orders.

CONTENTS

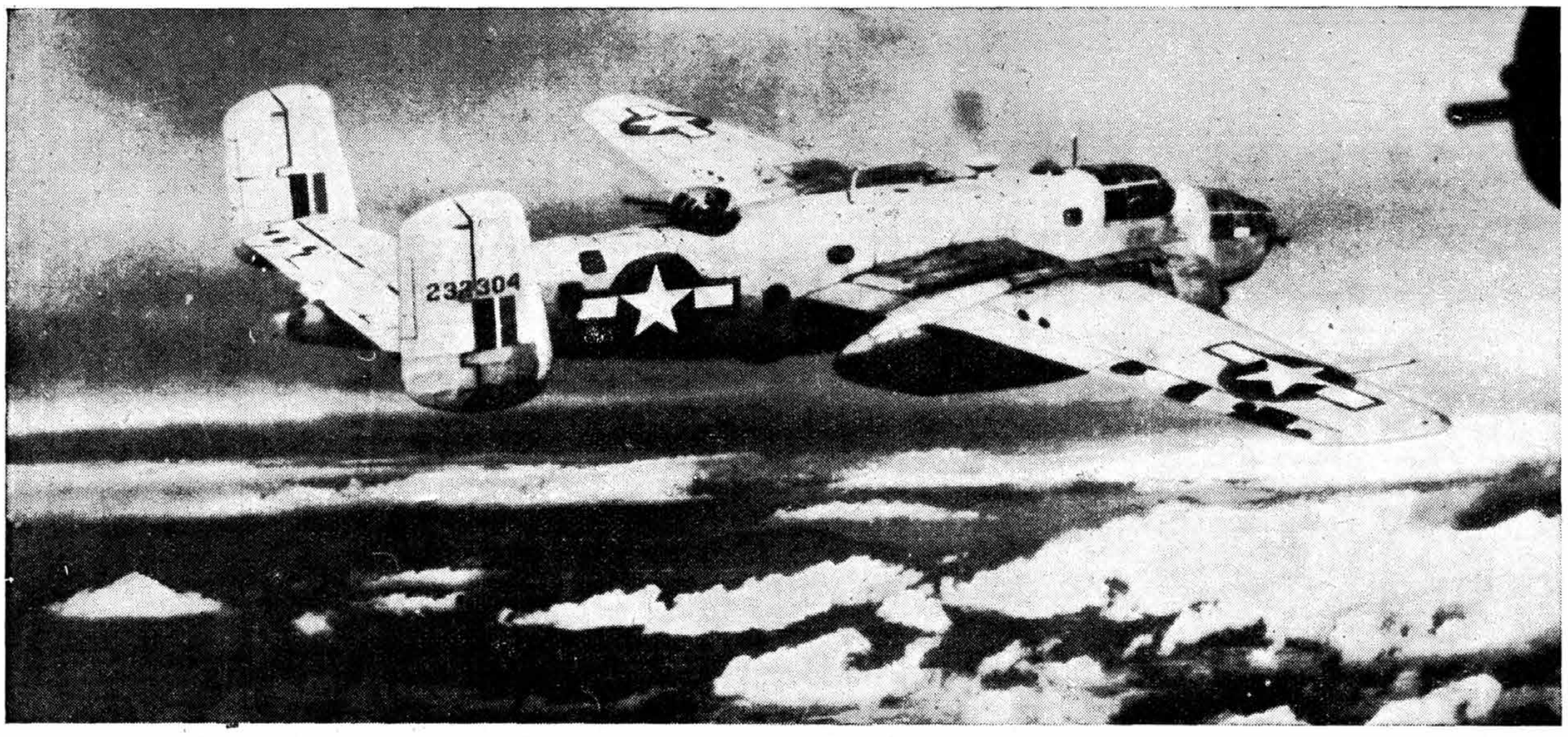
Sir Geoffrey de Havilland

AT last an obvious omission from previous Honours Lists has been put right, and a knighthood has been conferred on Geoffrey de Havilland. He is one of the pioneers of British flying, one of the notable few who designed and built his own machine in 1909, and afterwards taught himself to fly. Since then he has been concerned with the production of more classes and types of aircraft than most men—perhaps more than any one man.

One's thoughts go back to his brilliant work at the Royal Aircraft Factory and the design of the B.E. machines; to the D.H.2 fighter, the D.H.4 and 9 bombers, and many more, in the last war; to the series of civil aircraft produced in the inter-war years, and finally to the remarkable Mosquito of the present day. No one man has served his country more faithfully with his brains and enterprise, and no knighthood has ever been better earned.



NIPPED IN THE BUD: A Japanese torpedo-bomber blown to pieces by the anti-aircraft guns of a U.S. aircraft carrier in the Marshall Islands. The torpedo can be seen breaking away from the machine.



A Mitchell of the 12th U.S.A.A.F. over Jugoslavia. Note the R.A.F. markings on the tail. The black patches denote flak holes made on previous raids.

WAR in the AIR

The R.A.F. Loses an Old Friend, "Scharnhorst" : R.N. and R.A.F. Win Biscay Battle : Methodical Obliteration of Berlin's Factories

THE sinking of the *Scharnhorst* by the Home Fleet was certainly a matter of interest to the Royal Air Force, even though aircraft were unable to take part in that weird and grim battle fought in the darkness of the Arctic circle. Destroyers had to play the part so often played in the Mediterranean and in the chase after the *Bismarck* by Swordfish, and race ahead to slow up the fast fleeing German ship with torpedoes, so that the British battleship could catch up and put the enemy out of action with her big guns. As with the *Bismarck*, the *coup-de-grâce* was administered by the torpedoes of a cruiser.

The news must have sent the minds of many R.A.F. officers back to the days when desperate risks had to be run by our bombers at Brest and La Pallice in attempts to sink the *Scharnhorst*, and with those thoughts must go a feeling of satisfaction that the R.A.F. did succeed in preventing her and her consorts from getting loose again into the Atlantic to prey upon Allied shipping. The cost in R.A.F. lives and machines was heavy, and the necessity for constant attacks postponed the day when Bomber Command could devote its full energies to striking at German production, but the efforts of the airmen played no negligible part in saving the country from possible defeat in the all-important Battle of the Atlantic.

The *Scharnhorst* was sunk on Boxing Day—a "loud Sabbath," to quote Tennyson's description of the battle of Waterloo. On the two following days the Navy and Coastal Command combined in a spirited and most successful action in the Bay of Biscay, when a small but fast blockade-runner and three German destroyers were sunk. The blockade-runner was successfully dealt with by the aircraft. One can only guess at her cargo, but the Ministry of Economic Warfare thinks it probable that she was laden with tin, rubber, edible oils, tungsten and/or quinine. When hit by bombs the ship burst into flames, and a series of explosions occurred on board. Then other aircraft spotted 11 German destroyers steaming together, and by that time two British cruisers, H.M.S. *Glasgow*

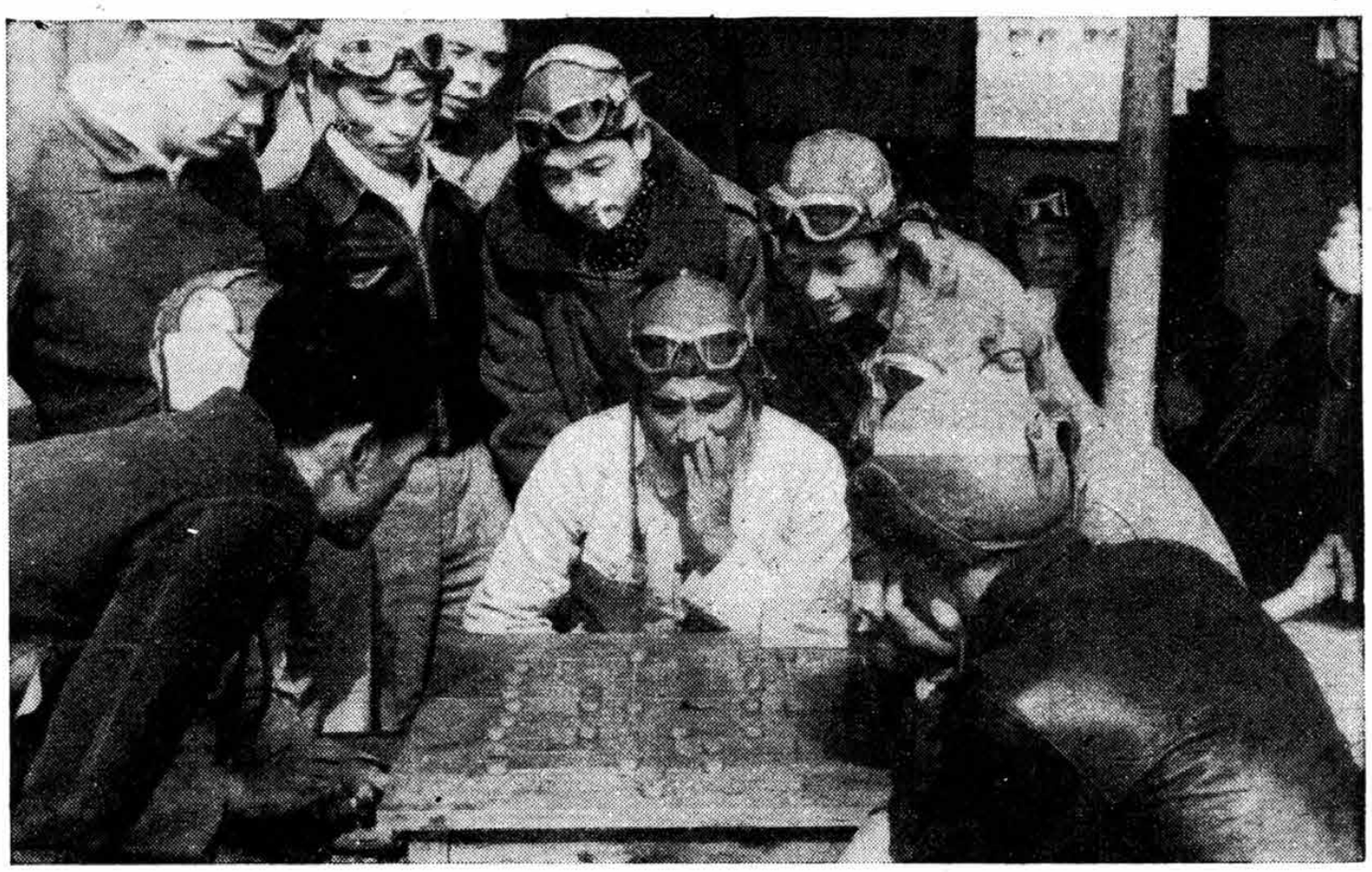
STOP PRESS : Mud holds up a Public Relations Overseas Unit jeep on an airfield in Italy.

WAR IN THE AIR

and H.M.S. *Enterprise* arrived on the scene and promptly attacked. The German Navy is believed to have not much more than 20 destroyers left, so this blockade-runner was evidently full of something which the Germans very much wanted to get safely delivered, as they risked such a large proportion of their surviving surface fleet in the effort to protect her. Five of the destroyers were of the new Narvik class, each of which has gun-power not much inferior to that of H.M.S. *Enterprise,* a 25-year-old ship of 7,580 tons. But the Germans would not fight. The flotilla split up and dispersed in groups of three or four ships. Meanwhile, all aircraft which could get there joined in the fight. There was some attempted interference by enemy aircraft, but it does not seem to have amounted to much. Beaufighters and Mosquitoes gave air cover to the British cruisers, and one Heinkel 177 was shot into the sea by a Mosquito. One Halifax and one Beaufighter were lost, apparently having been shot down by *flak* from either the blockade-runner or the destroyers. Three of the latter were certainly sunk by the guns of the two cruisers, and others were known to have been damaged. The engagement resulted in a heavy loss to German surface sea power, and it was a grand example of combined work by the Navy and Coastal Command. Neither by itself could have brought off such a satisfactory result, but by working closely together they scored a victory which was equally creditable to both.

More Berlin Devastation

THE Battle of Berlin goes stormily on through the long winter nights, and the small hours of Christmas Eve saw one brief but heavy attack. There have been more since then. Often

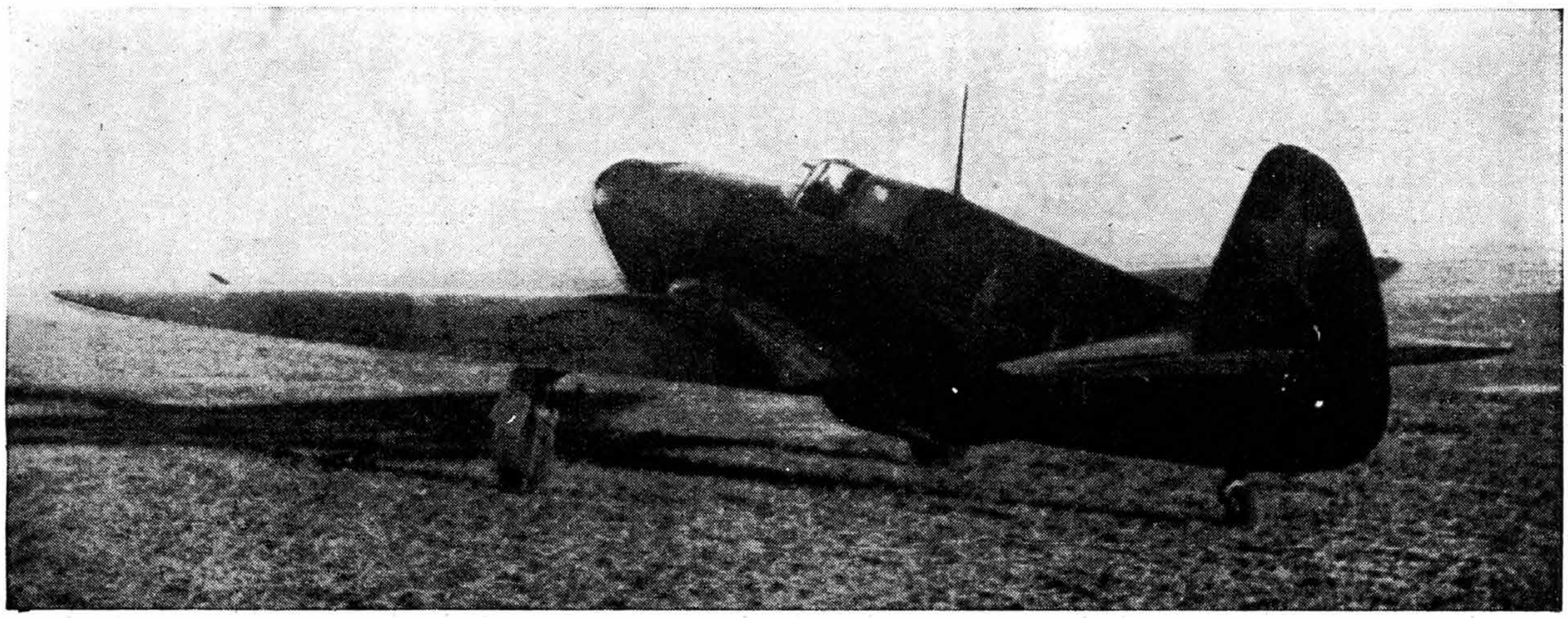


READY TO SCRAMBLE : Chinese pilots at the "Ready" playing "Wei Chi" to pass the time. "Wei Chi" is a complicated form of draughts played on the lines instead of the squares.

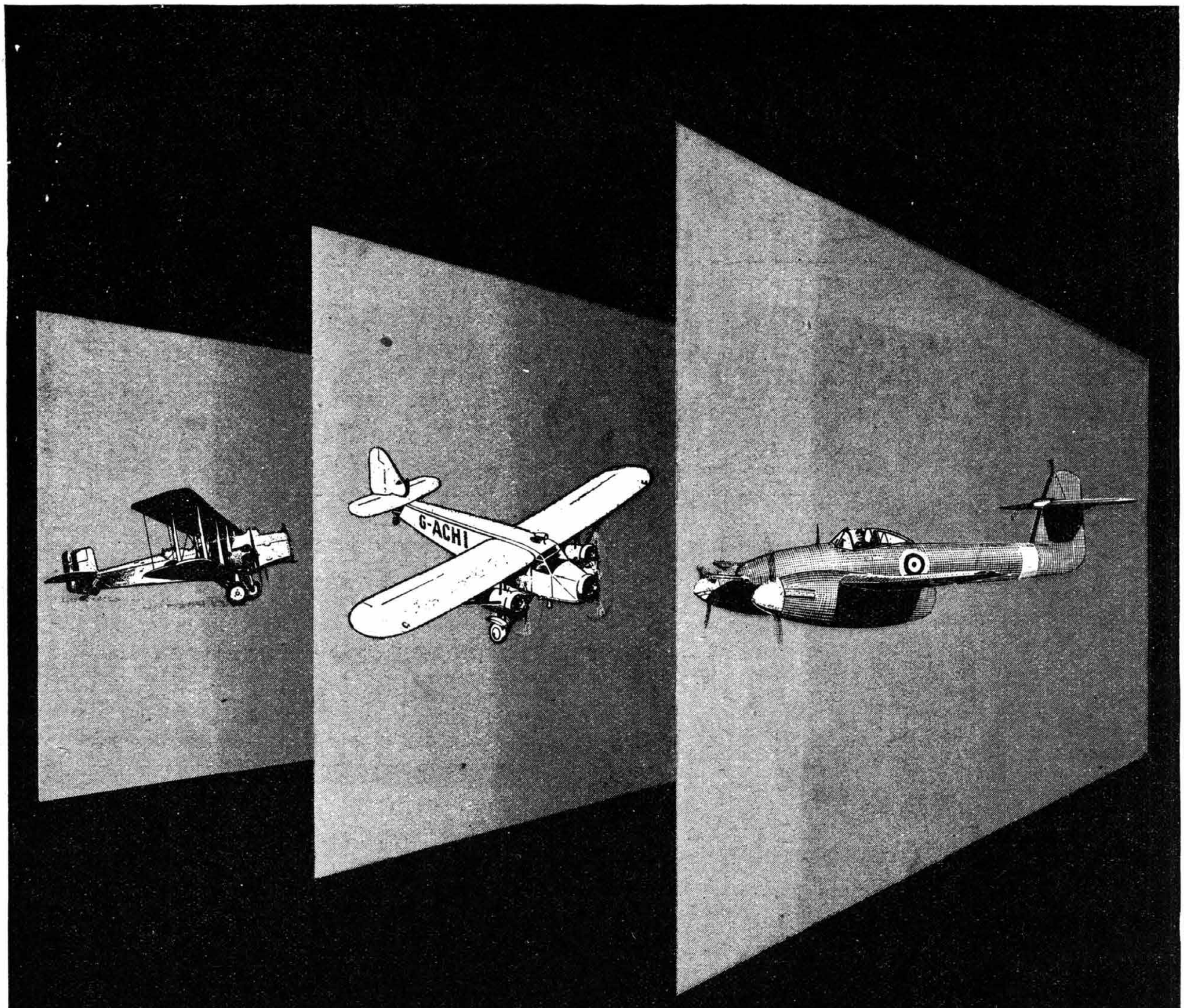
the cloudy sky has provided cover for the British bombers and has blanketed the searchlights and *flak* of the defence. It has not, however, defeated the Pathfinders, who vary their methods and drop whichever sort of flare will best help the bombers in the circumstances of each particular night.

The defensive fighters remain the most formidable opponents with which the bombers have to deal, but luckily their number is limited, and Bomber Command has lately developed great skill in misleading them. On the night of December 29th, for example, diversionary attacks were made on several targets not far from Berlin, which drew off the fighters and left the way clear for the main force to get over the Capital almost unresisted. In half an hour, between 8 p.m. (B.S.T.) and 8.30 the raiders dropped 2,000 tons of bombs, and so thick were the great bombers in the air over the target that some pilots said they found difficulty in squeezing into the queue for their bombing runs. Reports from Sweden say that the eastern and southern parts of the city were chiefly devastated, and the Templehof air base was one of the points which suffered—though not to such an extent that aircraft were unable to take off from it next day. It would take an extensive "Tedder Carpet" to put that airfield out of action, and probably the result would not be worth the effort.

The cost of that night's work to Bomber Command was no more than 20 machines, which was a very low proportion of the numbers despatched. Losses have been steadily growing smaller in recent months in proportion to the effort, and the fighters do not have things all their own way. During 1943 machines of Bomber Command



MORE DEADLY THAN THE MALE? : Lily Litvyak, fighter pilot and junior lieutenant in the Russian Air Force, takes off on her Yak I. She has 130 sorties and seven enemy aircraft to her credit.



Experience extending from the twin engine Westbury fighter of 1926 to the Wessex Air Liner of 1930 and so to the Whirlwind fighter of to-day, gives assurance that Westland will be in the forefront of development to-morrow.

WESTLAND AIRCRAFT
LIMITED

WAR IN THE AIR

ENEMY AIR LOSSES TO JANUARY 1st

	Over G.B.	Con-tinent	Middle East	N.W. Africa
Dec. 19	1	0	0	43
,, 20	0	12	0	28
,, 21	0	4	2	1
,, 22	0	0	0	0
,, 23	0	1	1	2
,, 24	0	1	0	1
,, 25	0	1	0	1
,, 26	0	0	0	0
,, 27	0	2	0	0
,, 28	0	1	0	20
,, 29	0	1	0	0
,, 30	0	5	0	11
,, 31	0	4	0	0
Jan. 1	0	2	0	0
	1	34	3	107

Totals: West, 7,828; Middle East, over 5,760: North-West Africa, 3,890

have shot down some 250 enemy night fighters. This is not a crippling loss to the Germans, even though they are very short of fighters, but the important point is that never have the German defences prevented a night force of Bomber Command from achieving its object. During 1943 air attack by night has undoubtedly had the mastery over air defence.

Incidentally, although revenge and reprisals are no part of the plan of the Air Staff and the higher authority which controls it, it is interesting to remember that December 29th was the third anniversary of the German raid which produced the great fire of London.

Middle and Far East

NO war commentary would be justified in omitting reference to the magnificent forward thrusts of the Russians on the two sections known as the Vitebsk front and the Kiev salient, even though the reports of air activity there are as meagre as usual. One has noticed that of late the Russian claims of enemy aircraft destroyed have been very modest, which may mean that the weather has not permitted much flying, or perhaps that the Germans have not given the Russians many opportunities of shooting down *Luftwaffe* aircraft.

For a long time past everyone has known that the German strength in fighters on that front has been jejune. Now it is quite probable that with prospects of invasion in the West looming nearer, the enemy is doing his utmost to concentrate a useful force of bombers there to strike at the Allies when they start to land.

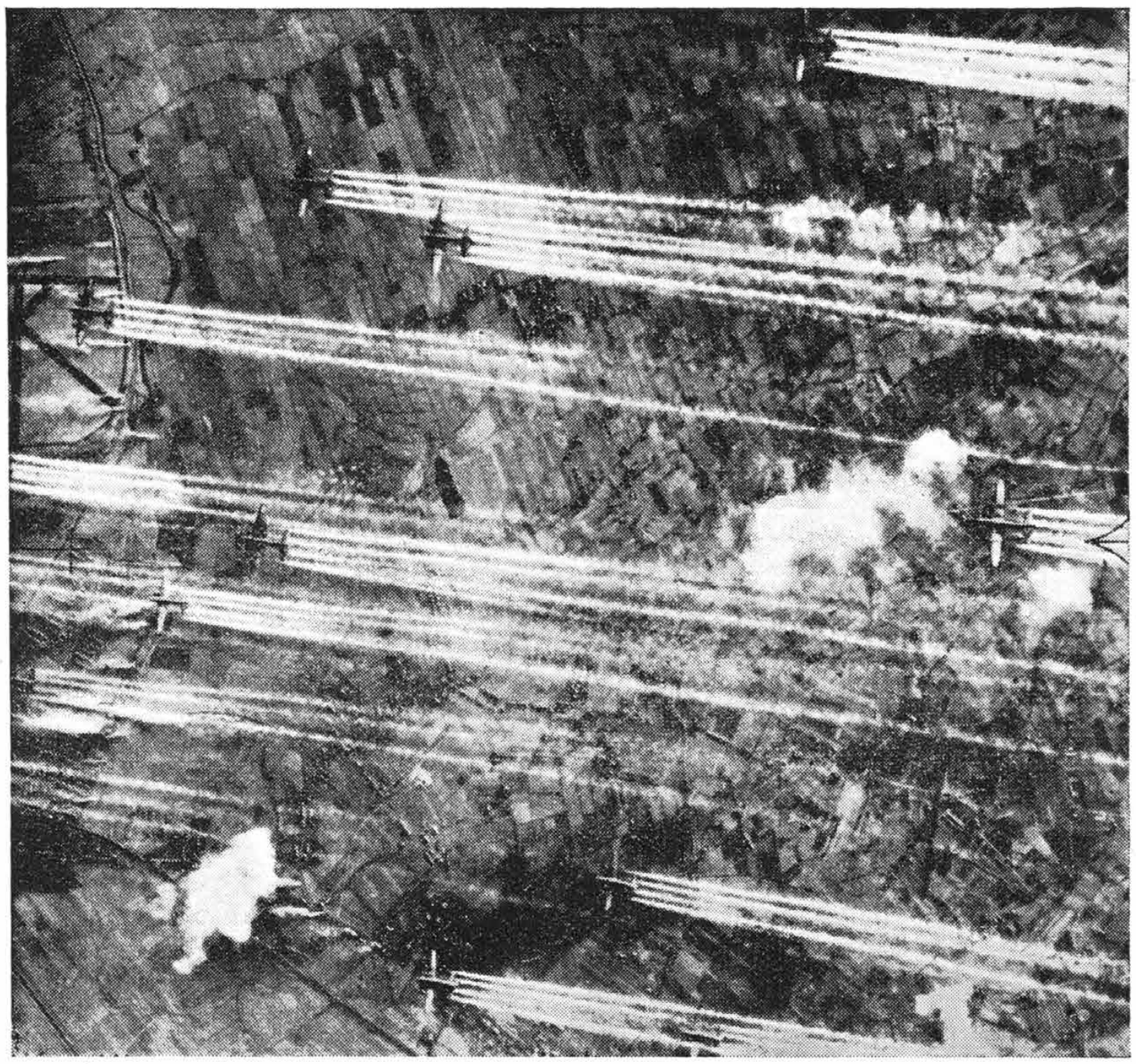
However, a report from Moscow states that on the Vitebsk front the failure of the *Luftwaffe* and A.A. fire to keep off the damaging attacks of the Red Air Force has had a most depressing effect on the fighting spirit of the German soldiers. In their earlier campaigns the Germans were accustomed to rely on the *Luftwaffe* to get them out of most of their difficulties, and now the tables are turned.

In the slow-moving Italian campaign the New Year was ushered in by such terribly bad weather that air activity was reduced to a minimum, but the Allied lighter classes of machines managed to do some patrols and to help the infantry in their painful advances against hill villages which the Germans defended resolutely. It is unusual for anything to be heard of German aircraft in that fighting, and one cannot say that their plan of conserving their exiguous air strength on that front has not been prudent. The mountains, the weather and the mud have provided the Allies with quite sufficient difficulties.

In the Aegean, on the other hand, the aircraft of the Middle East have been very active. They are being used, somewhat belatedly, to try to make good the set-back which our men received when they attempted to seize the three Dodecanese islands of Cos, Leros and Samos. Now Rhodes has become the centre of attention, as it should have been from the first, and is being treated to an intense bombardment from the air. It has been described as a German Malta, but little fear is felt that it will emerge from its trials in the victorious fashion of the real Malta, and it is not likely to receive from Hitler the decoration *Pour le Mérite*, or any other sort of equivalent to the George Cross. The inhabitants of Rhodes would certainly not appreciate any German decoration.

This aerial bombardment is obviously a preliminary to some forward move, though when and how it will come cannot at present be foretold. An invasion of the Balkans is one of the possibilities now being widely discussed, and if it takes place it will be quite necessary for the Allies to dominate the Aegean Sea and its many islands. The Dodecanese are the nearest, and have to be dealt with first.

Far away in the Pacific the Americans have been gallantly pressing forward in New Britain, always making it a point to secure airfields as soon as possible. Marines captured the strips at Cape Gloucester just before the close of the old year, and the threat to the great Japanese base at Rabaul is daily growing stronger.



THE WRITING ON THE WALL: A fantastic pattern made by the exhaust trails of high-flying Fortresses on their way to Bremen. The photograph was taken from an even higher formation.

BRITISH & U.S. AIR LOSSES to JAN. 1st

	Over G.B. A'crft.	Continent B'brs.	Continent F'trs.	Middle East A'crft.	N.W. Africa A'crft.
Dec. 19	0	0	0	0	16
20	0	67	11	0	11
21	0	0	8	0	1
22	0	0	4	0	2
23	0	17	1	1	0
24	0	1	0	0	0
25	0	1	0	0	3
26	0	0	0	0	0
27	0	0	0	0	0
28	0	2	1	0	11
29	0	20	0	0	0
30	0	22	13	0	6
31	0	29	3	0	3
Jan. 1	0	28	0	0	0
	0	187	41	1	53

Totals: West, 8,980; Middle East, about 2,342; North-West Africa, 1,472.

HERE AND THERE

"As You Were"

THE Admiralty states that the Grumman Martlet and Tarpon now in service with the Fleet Air Arm will in future be known by their original American names of Wildcat and Avenger respectively.

Croydon Ruled Out

MR. W. P. HILDRED, Director-General of Civil Aviation, has just told a deputation that Croydon can never be developed into a super airport because sufficient space cannot be provided for the bigger transport aircraft which the post-war period will bring.

Cannons for Douglas

AT Wright Field, U.S.A., recently, a Douglas Havoc of the U.S.A.A.F. was tested with a 37 mm. cannon mounted in the nose.

This is the second A-20 type Douglas to be fitted with cannon, the first being the P-70 night-fighter version which has four 20 mm. cannon grouped in the nose.

"Arsenal for America"

"BRITISH workers will not consider the war over when the last shot has been fired in Europe, but will strive to make England the arsenal for America in destroying Japan," said Mr. Pat J. M. Carey, chairman of Handley Page's joint production committee, who is one of four British war workers touring the U.S. as labour ambassadors.

He made this observation when speaking at Buffalo last week.

U.S. Production News

SEVERAL items of news have been recently released by the U.S. Office of War Information, namely, that the Lockheed concern is turning over its entire facilities to the production of the P-38 Lightning, the output of which will be doubled, that the Bell P-39 Airacobra is being supplanted by a new model with two-stage supercharged Allison giving efficiency up to 40,000ft., and that the output of the C-46 Commando "is to-day on a basis that will top any previous rate of production."

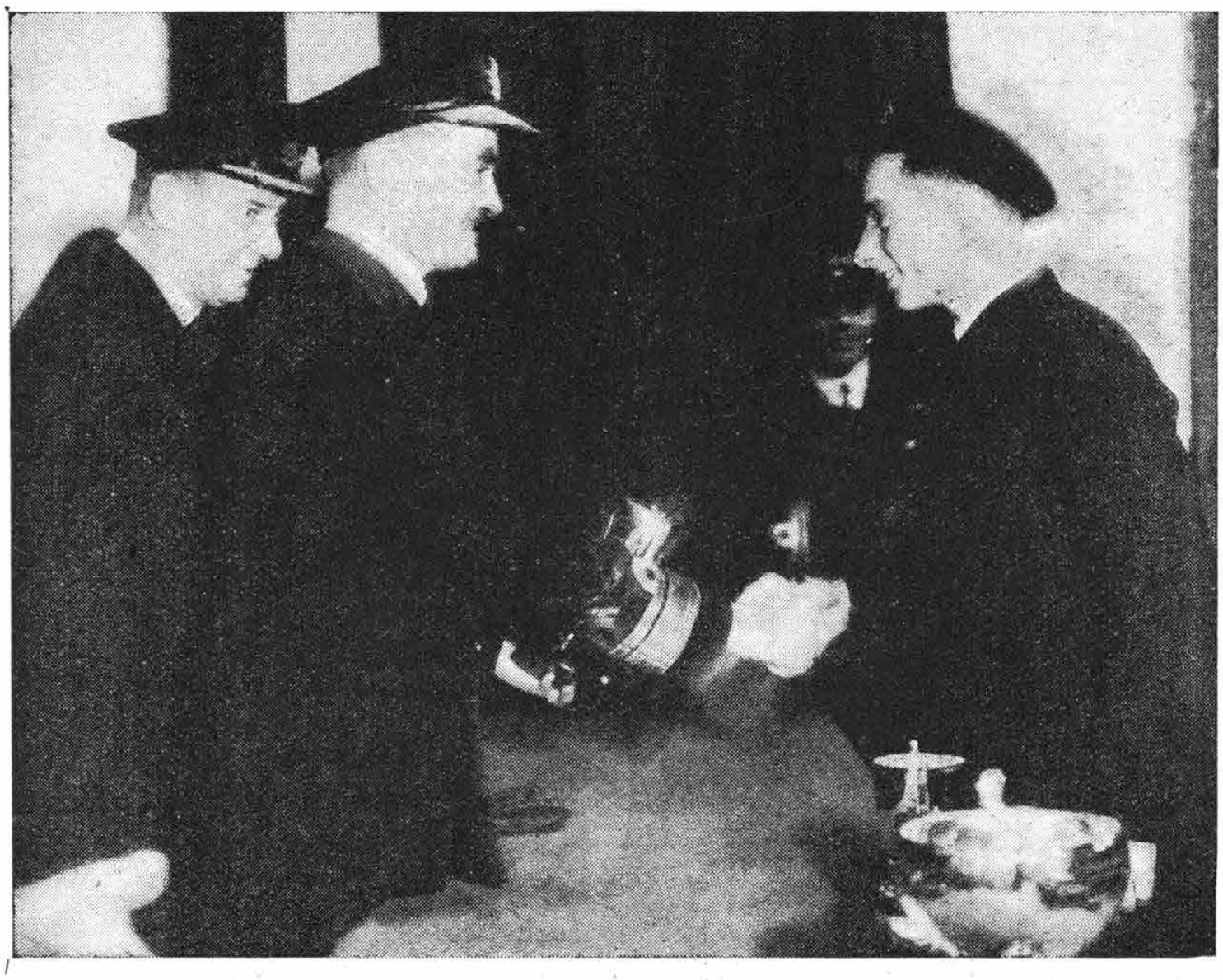
Still Bigger Output Needed

BUT in case anybody should be feeling too well satisfied with American output, Mr. Charles E. Wilson, executive vice-president of the U.S. War Production Board, told his colleagues at Washington recently that the 9,000 aircraft being produced in the U.S. during December "just is not good enough for the job ahead."

The volume of material sent to North Africa and Italy was, he said, "insignificant" compared with the job of equipping the Allied forces for the invasion of Europe.

Browned Off

FROM the U.S.A.A.F. at Wright Field (their equivalent to our Farnborough) comes the story of how a young German pilot, thoroughly "browned off" with his side of the war, flew his Ju 88 from Rumania to a British airfield on the island of Cyprus and surrendered himself, complete with aircraft in good working order, to the Allies.



HONOURABLE DEFEAT : The Fifth Sea Lord, Rear Admiral D. W. Boyd, C.B.E., D.S.O., presents his own cup to the "best loser" in a boxing contest for Fleet Air Arm apprentices. The smiling recipient is 17-year-old P. E. Tucker, of Shoeburyness, who lost his bout on points after a splendid fight.

U.S. Flak Helmets

NEW metal helmets designed to give greater protection against shell splinters are now being issued to American aircrews on "ops" over Europe. Two designs are available for use. They fit over earphones, microphones, oxygen mask, goggles and head covering.

Lowestoft A.T.C.

NO. 469 (Lowestoft) Squadron A.T.C. is to be congratulated on the very good effort it has displayed in the recruiting campaign now in progress for the Air Training Corps all over the country.

It has produced an attractive brochure, with a foreword by Air Marshal Sir Patrick H. L. Playfair, Commandant A.T.C. for the East, describing its own formation and growth and giving the reader other encouraging information about the Corps.

This brochure is suitably illustrated, nicely arranged, and altogether constitutes a creditable piece of publicity for a good cause.

New Recognition Feature

IN this issue of *Flight* there begins a new feature dealing with aircraft recognition under the heading "Aircraft in Flying Attitudes."

As in the case of "Aircraft Types and Their Characteristics," which concluded last week after covering some 160 different types, the new series will normally occupy the two centre pages so that the reader can easily remove and keep them for reference.

Four aircraft will be dealt with each week, each type being illustrated by five silhouettes—plan, front, side, and two perspectives—and an actual photograph, so that the student can familiarise himself with the appearance of the machine in a number of different attitudes in which he may expect to see it flying. The salient features of each machine are briefly outlined in the adjoining text.

In Favour of Competition

THE need to relax pointless restrictions which slowed the development of international airlines before the war, and accept the fact that there will be competition in air transport as in all forms of international business, is the view put forward by Mr. William Burden, the U.S. Secretary of Commerce, writing in the December issue of the *Atlantic Monthly*.

America need not fear that her air transport industry will be overwhelmed by foreign Government airlines, he says, and claims that there has been no rapid technical development where Government monopolities have existed.

Pointing out that air transport is a business, not a weapon, he believes that the best interests of all countries will be served by allowing commercial flying to develop along much the same lines as shipping.

EVEN I CAN UNDERSTAND—15.

Q. *What are the principles of supercharging?*

A. The power of an aircraft engine depends on the pressure developed in its individual cylinders whilst on their working strokes. This pressure arises from the combustion of liquid fuel which has been introduced into the cylinder along with a charge of air during the induction stroke.

Since it is a chemical fact that good combustion is possible only over a comparatively narrow range of mixture strengths, it follows that the amount of fuel that can be burnt per power stroke is limited by the weight of air in the cylinder. More air means more power and so the current demand for increased engine outputs is met by larger cylinders, by more of them, or by running at higher speeds to deal with a greater weight of air in unit time.

With a normal (unsupercharged) engine, it is the pressure of the atmosphere which forces air through the carburettor and into the cylinders on the induction stroke. As atmospheric pressure falls with altitude, the weight of air available for combustion also falls off and power goes lower in sympathy (Fig. 1).

It was soon realised that this natural fall-off with altitude could be avoided if we could deceive the engine that it was still at sea level by blowing air into its induction system using some kind of pump. This process is " supercharging." Then why not have a slight pumping effect at sea level to boost up the air flow and so the take-off power? This is " ground-boosting."

These two effects are often combined and an engine will be " ground-boosted " for take-off whilst still having a margin in pumping capacity to maintain the induction pressure to some altitude. If this altitude is great, then we have a " high-altitude " supercharger; it it is fairly low, we have a " moderate altitude " supercharger. Obviously, the higher we go, the larger must be the pumping apparatus (usually a centrifugal blower) and the more power it will absorb from the crankshaft.

For reasons of safety we cannot use the full delivery of a high-altitude supercharger at sea level and the throttle must be partly closed to give " maximum permissible boost " until a safe altitude is reached. This means that at low altitude there is a wastage of engine power in driving an oversize supercharging pump and for this reason the net power of an engine supercharged to high altitudes is always less near the ground than one which is supercharged to moderate altitudes.

These effects are indicated in Fig. 2, which is comparative with Fig. 1. Calling the unsupercharged engine 100 per cent. power at sea level, the ground-boosted engine will show better powers at all altitudes but will start to fall off at once from sea level. If the output of the supercharger is increased, the altitude performance will be better than the ground-boosted version but there will be some loss of take-off output as just explained. The high-altitude curve shows these effects to an increased degree.

For some time engines were available with alternative ratios for their supercharger gearing but the desire to have the best of two worlds in one unit led naturally to the development of the two-speed gear. With this mechanism, the blower will rotate at a moderate speed in low gear and give a good power at low altitudes by avoiding unnecessary pumping. At greater heights the gearing is arranged to drive the blower at a higher speed and deliver the permissible boost at a greater altitude. Thus, with this type of blower, there are two maximum powers at different heights (Fig. 3).

When air is compressed its temperature is raised and we know that high inlet temperatures and pressures promote detonation and knocking in the engine. Improvements in fuels have greatly assisted in this respect but where operation at high altitudes is required special steps are taken. Thus two blowers are used in series because two-stage compression is usually more efficient than single-stage compression. If charge temperatures still tend to run high, " intercooling " may be resorted to, which means passing the compressed air through a sort of radiator between blower outlet and induction manifold. Fig. 4 indicates this arrangement and shows the power output obtainable with a mechanically-driven, two-speed, two-stage supercharger with intercooler.

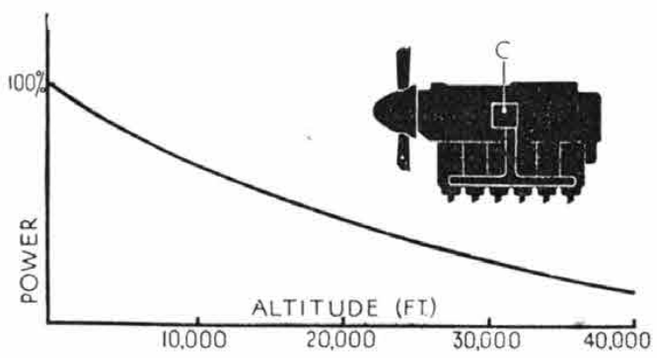
An ideal drive for a supercharger would be an infinitely variable gear which would avoid the " valley " in the altitude power curve which now occurs due to the low ratio being too low and the high ratio being too high at certain intermediate altitudes.

The general effect of an infinitely variable drive is obtained by using an exhaust turbine to drive the blower. With this device the speed of the blower can be regulated by admitting more or less exhaust gas to blow on the rotating blades of the turbine. This effect is approximately obtained automatically, since, for a certain pressure in the engine exhaust pipe, the falling atmospheric pressure produces a bigger pressure drop across the turbine and enables it to develop more power. The limit of altitude is reached when the speed and temperature of the turbine wheel approach the safe margin for the materials employed in its construction.

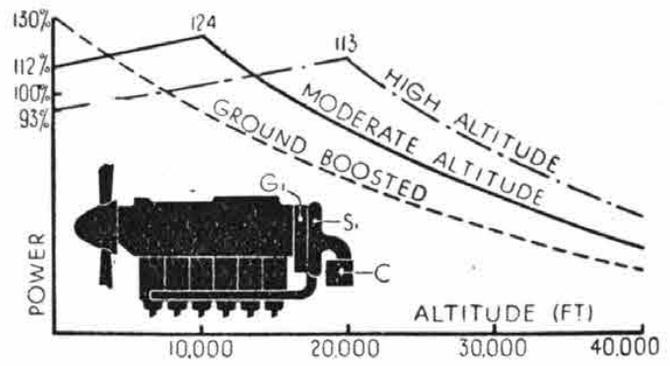
Quite often a combination of turbine and geared drives is used. In this case the mechanically-driven blower provides the ground boost for take-off and the turbo-driven blower looks after the altitude effects. Such a combination will give almost a straight-line power curve up to great heights as indicated in Fig. 5.

The supercharging arrangements for any particular installation will depend intimately on the engine characteristics and especially on the purposes for which the aircraft is intended.

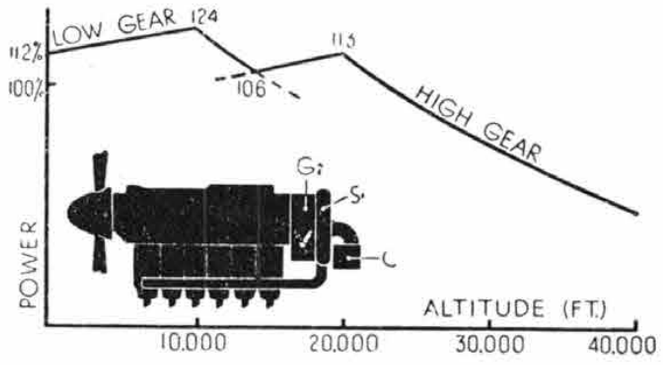
C = Carburettor
I = Intercooler
G_1 = Single-speed gear box
G_2 = Two-speed gear box
S_1 = Single-stage supercharger
S_2 = Two-stage supercharger
T-5 = Turbo—supercharger



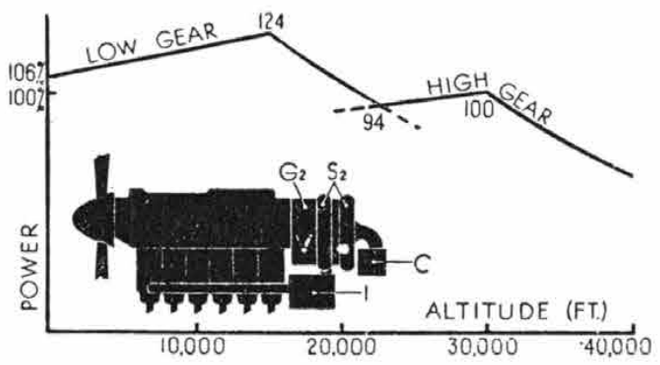
1. Unsupercharged



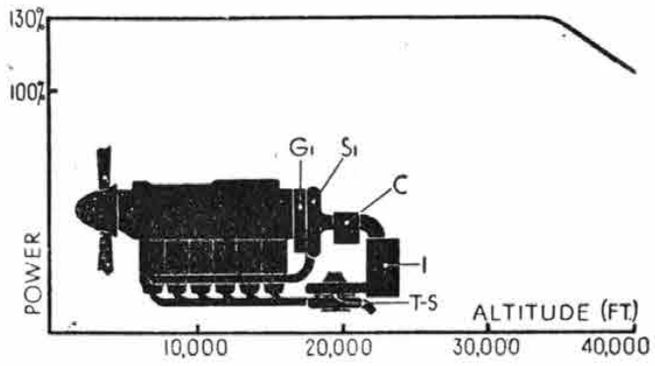
2. Gear-driven supercharger



3. Two-speed gear-driven supercharger



4. Two-speed, two-stage, gear-driven supercharger with intercooler



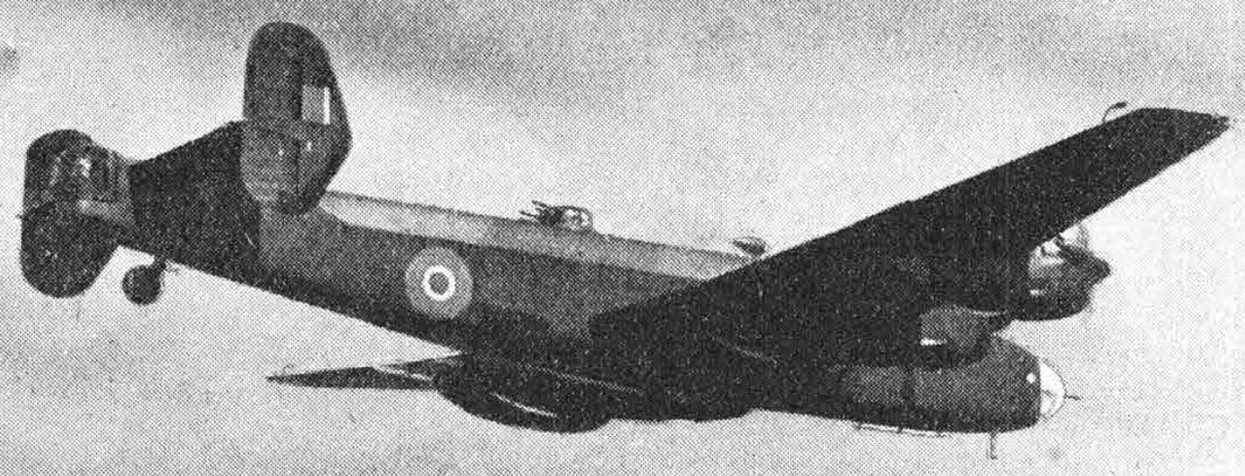
5. Gear-driven and exhaust turbine-driven supercharger with intercooler.

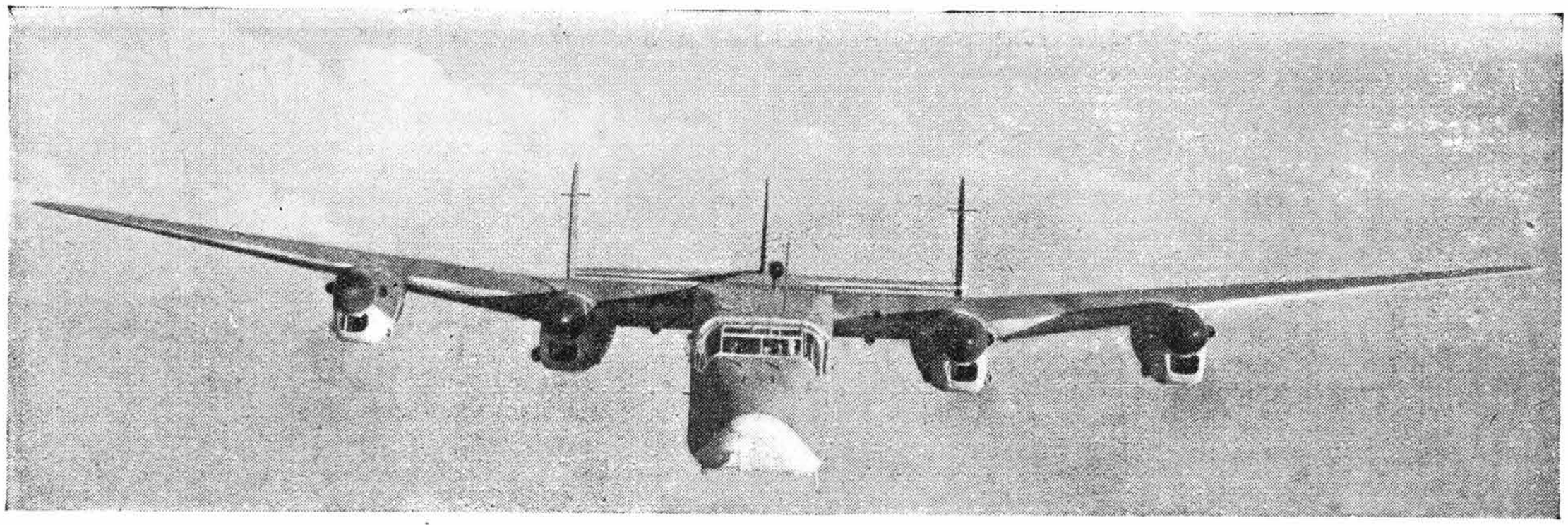
This is one of a series of articles on technicalities sponsored by The de Havilland Aircraft Co., Ltd., in the belief that they will prove of interest and use to students and others in the Services and the aircraft industry.

ONE WAY LOADS

. . . Concentrated attack by home-based bombers . . . mines in enemy waters . . . deep penetration . . . large force from North Africa . . . thousands of tons. . . . . Halifax bombers were there, taking one way loads to exact destinations, coming back for more, doing always the heavy duties, bringing nearer the day of victory. Then Handley Page air liners will carry big cargoes—out *and* home—on the great international air lines.

HANDLEY PAGE



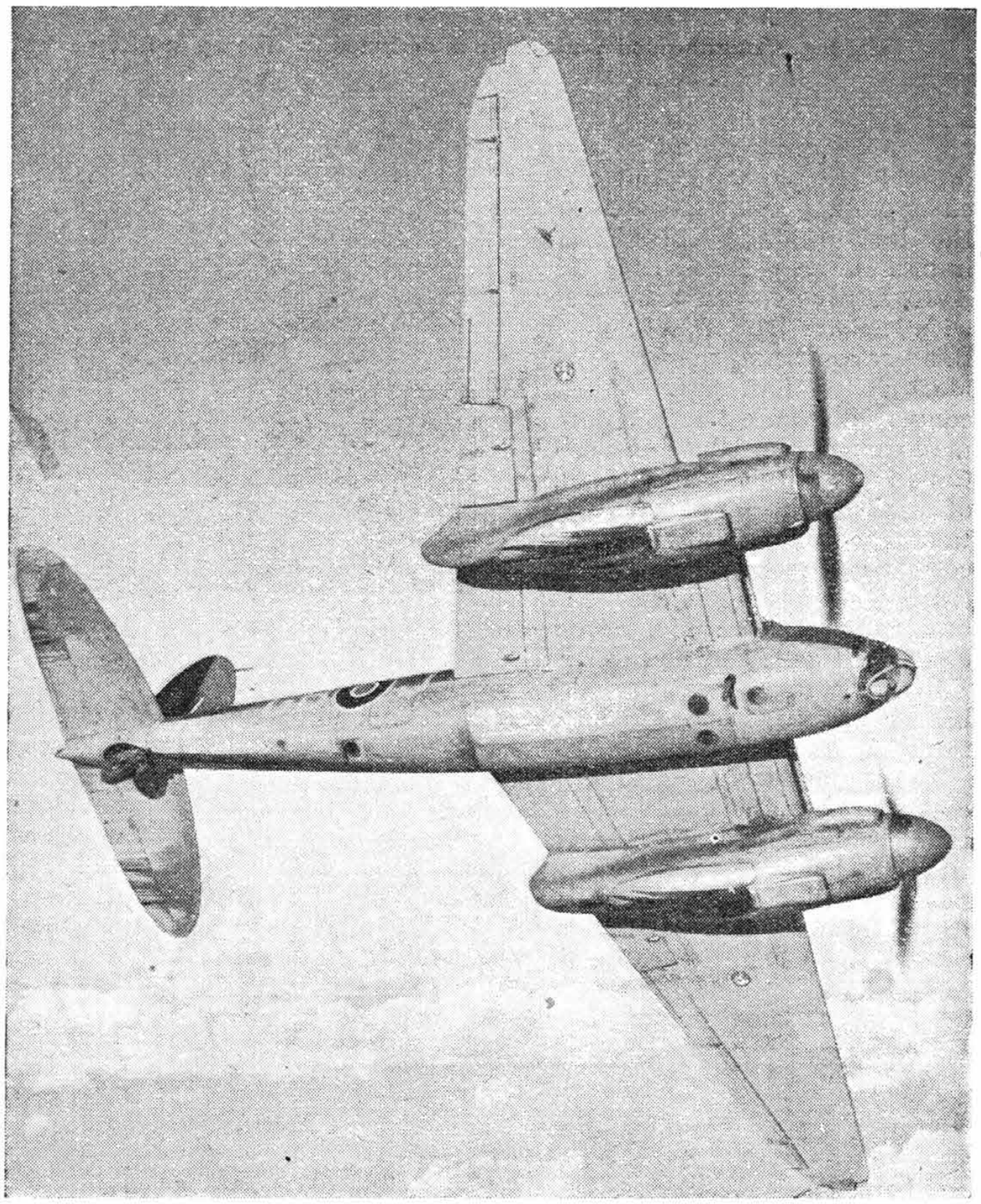


Looking Back

Evolutionary Development and Improvisation the Characteristic Features of 1943 : Multiple Functions of Types

APART from the introduction of one or two new types, or at least the release of the information that they had gone into operational service, 1943 was chiefly remarkable for the amount of highly successful improvisation and modification of existing aircraft. The result was that, on the one hand, range was greatly extended and targets became available which had previously been out of reach. On the other hand, types of aircraft initially intended for one purpose were modified and developed into extremely useful weapons with different functions.

Responsible for increasing the range of fighters was the coming into extensive use of auxiliary fuel tanks, often so mounted that they could be jettisoned. There is, of course, nothing new in the use of extra tanks mounted externally. In 1919, when pilots were struggling to get across the Atlantic, several machines had external streamlined tanks. The surprising thing about the "moderns" is that these tanks do not spoil performance to any serious extent. This fact was first discovered some years ago when the good old Hurricane was fitted with external bombs, which gradually grew larger and larger; and still the Hurricane continued to fly well. In the modern application the fuel tanks are often mounted on the bomb slips and interchangeable with the bombs. Thus a fighter can either be given a greatly increased range, or it can be used as a fighter-bomber over shorter ranges.



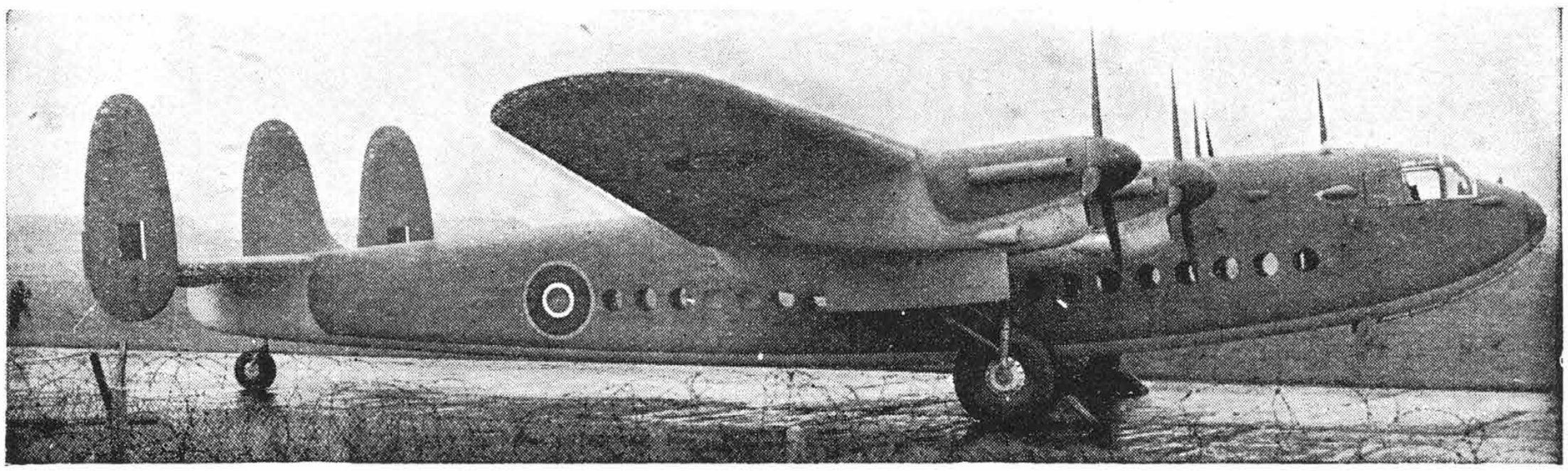
TWO FORMS OF EFFICIENCY : The Avro York (top) is a compromise between roominess, weight-carrying and speed. The D.H. Mosquito carries its concentrated load within a perfect streamline shape.

Versatility

As examples of versatility mention may be made of such types as the Bristol Beaufighter, the De Havilland Mosquito, and the Lockheed Ventura. The last named, for instance, developed from a civil type in the light of operational experience with the Hudson, can carry bombs or depth charges, or torpedoes, and long-range tanks. The Mosquito exists in many versions which, between them, account for 15 different functions. The Beaufighter, in addition to its terrific armament, has proved a highly successful torpedoplane. The Supermarine Spitfire, apart from its functions as a fighter, carrier-borne fighter (Seafire) and fighter-bomber, has done good humanitarian work in Air-Sea rescue.

In the bomber class the development has been mainly in the direction of modifications of existing types. The Handley Page Halifax, for example, has made its appearance with the original "double-chin" nose turret removed and replaced by a streamlined Perspex nose. A

LOOKING BACK



The big, straight-sided York cabin is designed to take up to fifty passengers or their equivalent weight in freight or fuel.

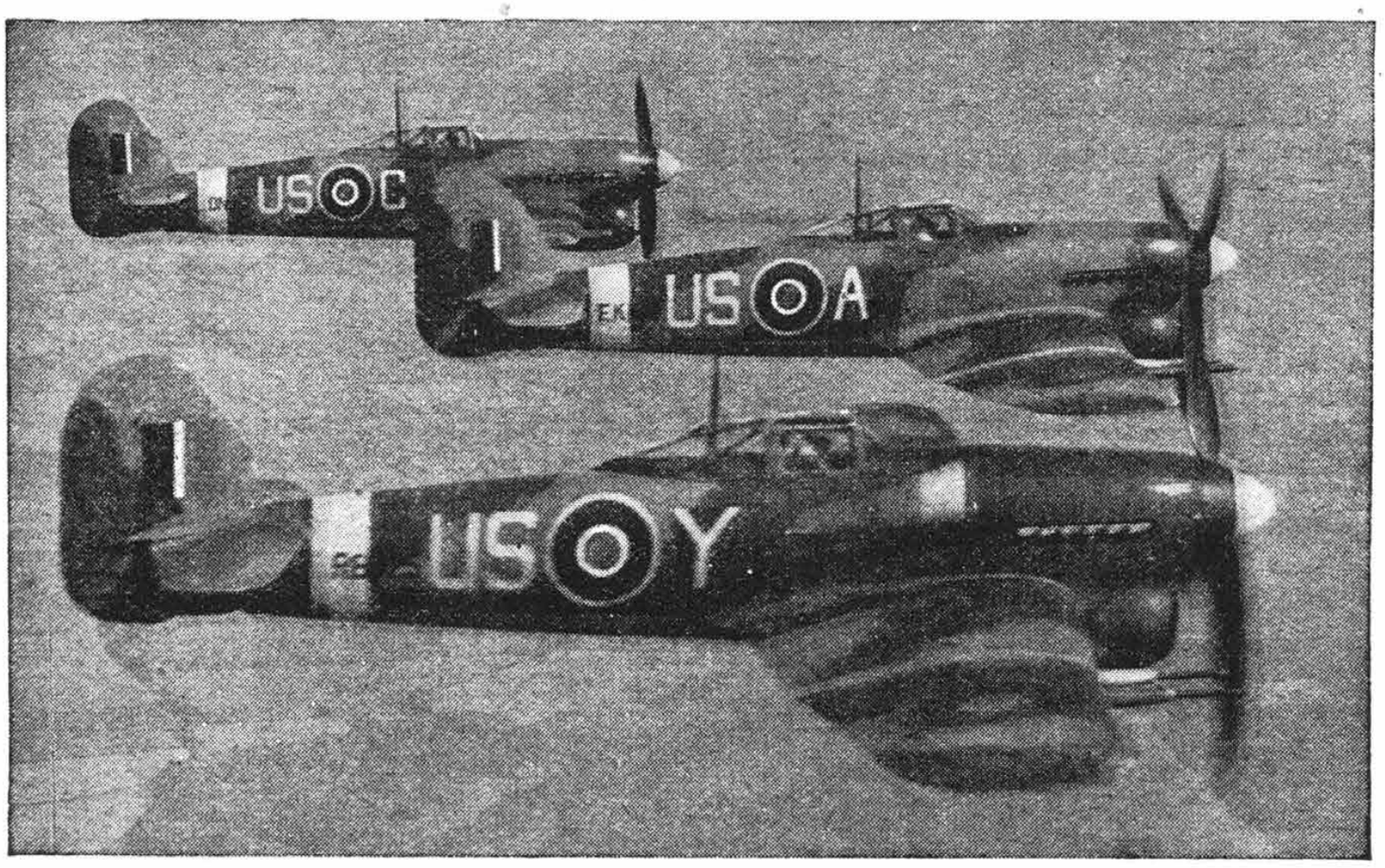
A 1943 "RELEASE": The Napier Sabre-engined Heston racer which was originally designed to beat the world's speed record.

still more recent modification has fins and rudders of a different shape, these and other changes having "cleaned-up" the machine and considerably improved the performance. The Avro Lancaster has been fitted with Bristol Hercules engines, this version being known as the Mark II. A Lancaster has been converted from a bomber into a mail-carrier (for the benefit of Canadians in this country), and, of course, the main modification, if indeed it is not more correctly to be adjudged an entirely new type, is the fitting of a larger fuselage for accommodating passengers and freight. This version, the Avro York, has already demonstrated its value in connection with the recent Teheran Conference.

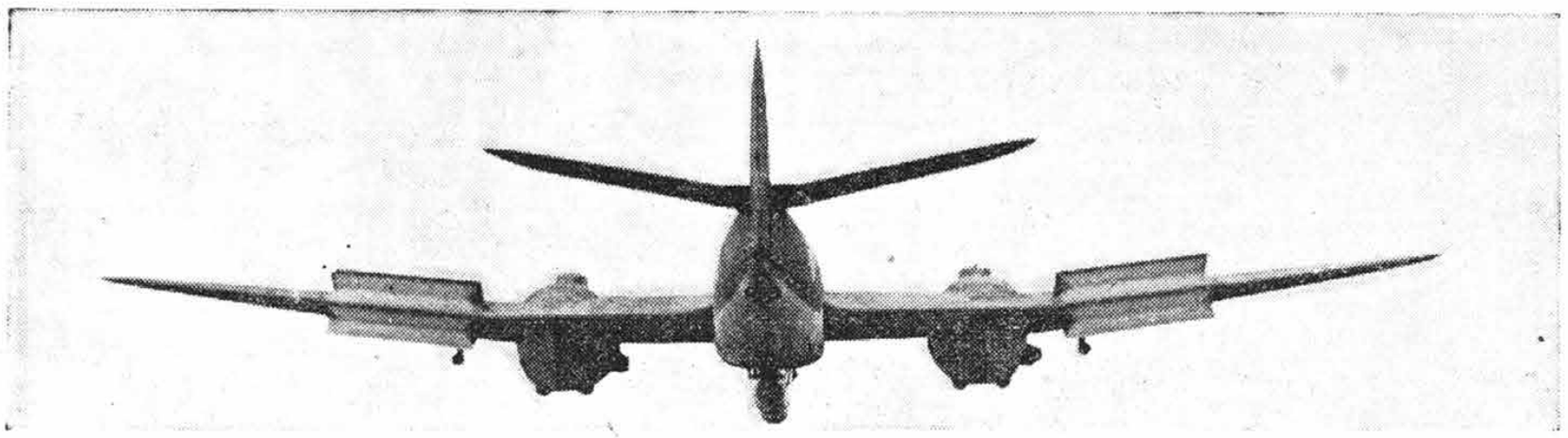
Developments in the four-engined bomber class may be expected, but the introduction of a new type takes a long time from the prototype to the production of it in quantities. The greatest step-up in size of which information has been allowed to be published is the Boeing B29 with its wing span of 141ft., a bomb load in the region of 17,000 lb. when the range is 1,000 miles, and a gross weight of well over 100,000 lb. It may be assumed that this machine is mainly intended for the war in the Pacific.

One of the most striking examples of evolutionary development is the Boeing Fortress. The original B299, which was the forerunner of the Fortress, had four Pratt and Whitney engines of 700 h.p. each. The earlier production models were armed with a few hand-operated machine guns in "blisters." Gradually the armament has been increased to a total of 13 guns, comprising several power-operated turrets and including, in the model B-17G, a chin turret. At the same time the engine power has risen from the original 4 × 700 h.p. to 4 × 1,200 h.p. (Wright turbo-supercharged Cyclones). The bomb load, however, is not very great except in the case of the very short-range version which carries bombs in racks under the wing.

The only new British fighter of which information was released during 1943 was the Hawker Typhoon. It is a considerably larger machine than the Hurricane (wing span 41ft. 7in.) and is fitted with the new Napier Sabre 24-cyl. sleeve-



On the drawing board the Hawker Typhoon (Napier Sabre) was an interceptor fighter. It is, however, earning a very good living as a fighter-dive bomber.



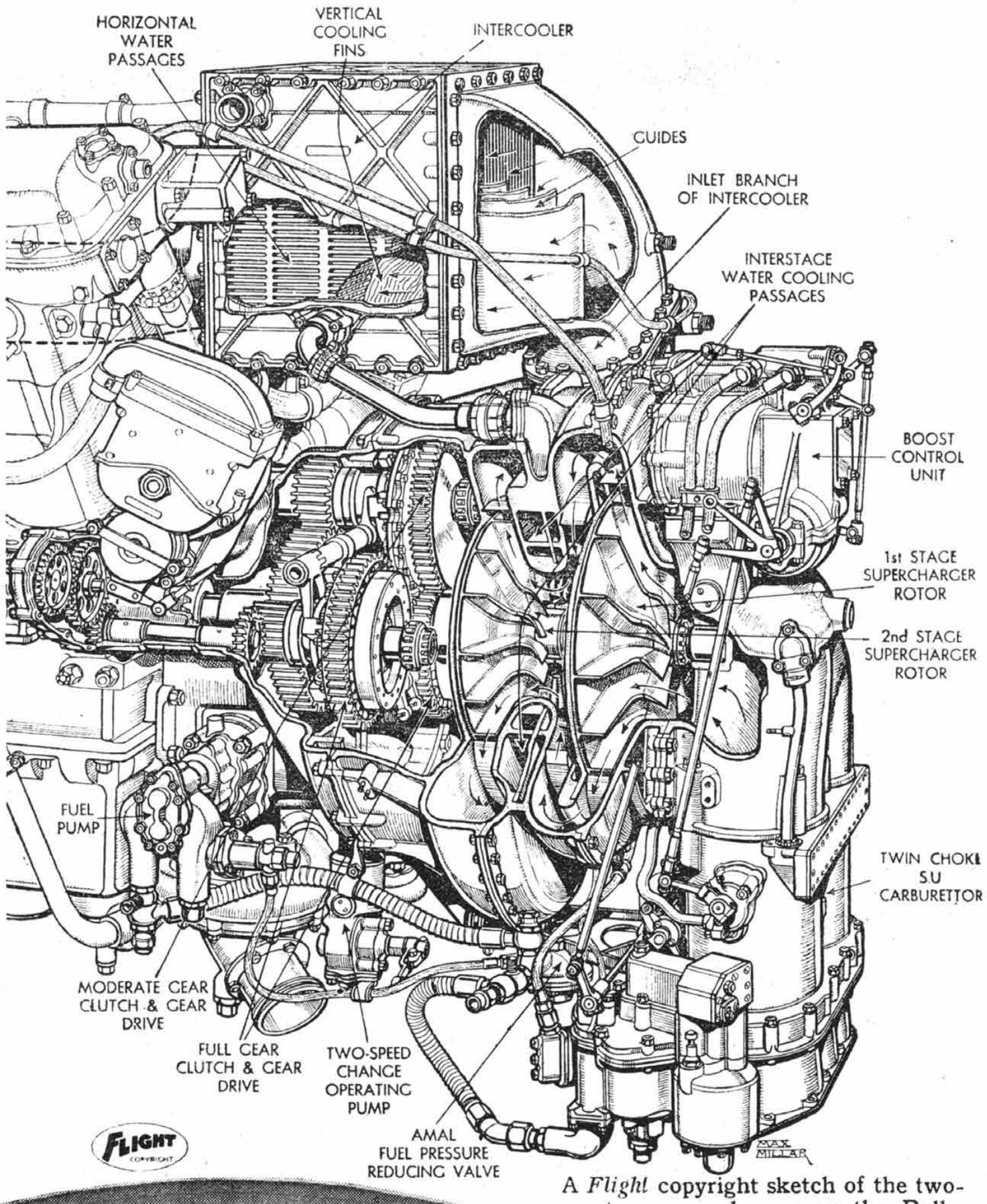
One of the essentials of a good torpedo-dropping aircraft is the ability to approach fast and to lose speed quickly while the torpedo is actually released. In the Beaufighter this is achieved by bellows flap brakes, which are operated by the slipstream.

valve liquid-cooled engine, which is in the 2,000 h.p. class. The armament may comprise 12 machine guns in the wings. This version is known as the Mark Ia. Or it may be four 20 mm. cannon, as in the Mark Ib, plus two 500 lb. special blast bombs. The Typhoon has wrought great havoc on the enemy, and in spite of the great load carried it is very manœuvrable, notwithstanding the fact that the wing loading is 44 lb./sq. ft. Pilots claim that they can turn "inside" the Fw 190.

Ad Astra

So far the Napier Sabre remains the only new engine to be "released," but the Rolls-Royce Merlin 61 in the Spitfire IX is giving excellent service, its two-speed, two-stage blower giving a range of operational altitudes which is extremely useful. Incidentally, it is of interest to recall that the Spitfire IX is now operational with both the very pointed wing tips for altitude work and with the "clipped" tips for increased manœuvrability.

Reviewing the position generally, it is found that there has been a tendency to increase wing loadings. This is natural in view of the fact that more and more load is being demanded from practically all classes of aircraft. The use of runways has made this increase possible, and it is fortunate that the skill of pilots has kept pace with the extra handling difficulties. In spite of this, however, it is obvious that there are limits beyond which it is unwise to go. The Bristol Bisley, for example, really started life as the moderately loaded Blenheim, but so much "junk" has



A *Flight* copyright sketch of the two-stage supercharger on the Rolls-Royce Merlin 61. This engine, allied to slight alterations in our fighters' wing-form, has given us the greatest operational heights.

The Supermarine Spitfire which, with two or four cannon, clipped, normal or pointed wings, as fighter-bomber or height-cover aircraft, is as new to-day as it was eight years ago.

LOOKING BACK

been added to its load, and so greatly has the wing loading increased, that the delightful characteristics of the old Blenheim have gone by the board. Perhaps the most difficult machine to handle is the Marauder, which holds the unenviable distinction of having the greatest wing loading of any aircraft in service. The run to take off is consequently long, and the opportunities for "swinging" are many.

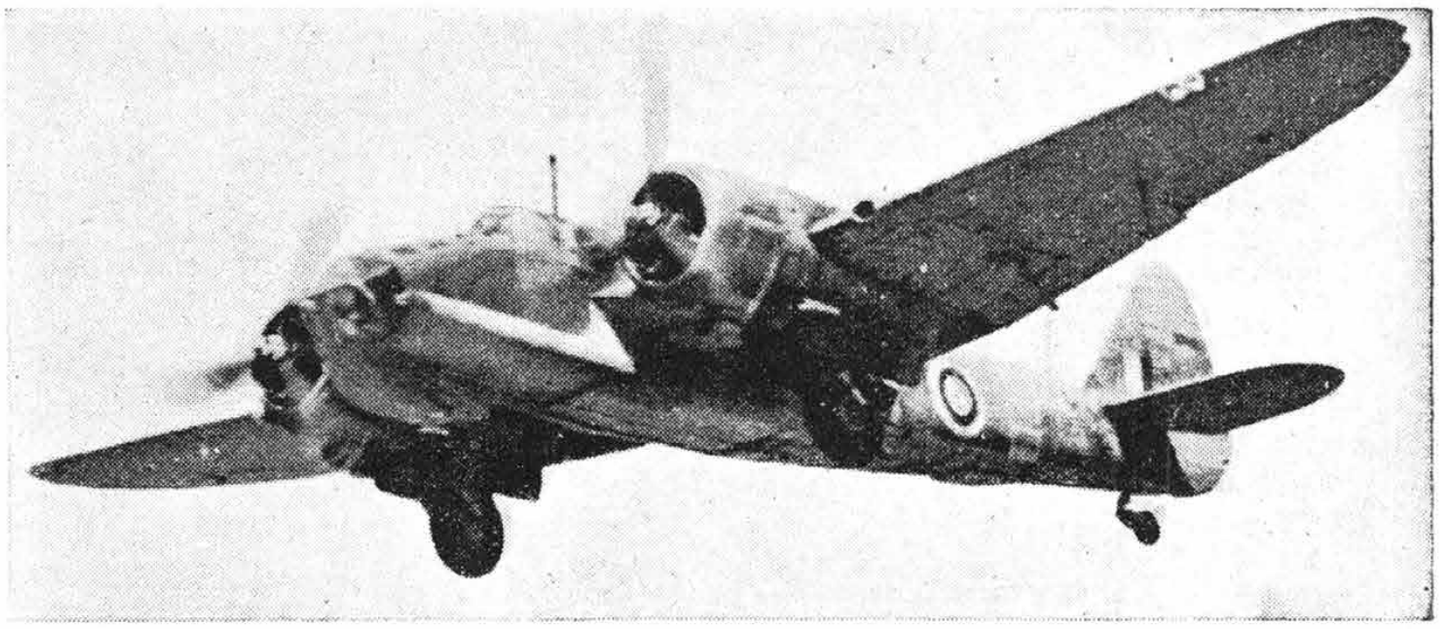
Arising out of the high-power engines that are now available, and the greater speeds attained, many types of aircraft have suffered from somewhat obscure tail troubles, some of which have given rise to structural failures. It appears that at these high speeds, reaching the speed of sound locally, the air flow does peculiar things and shock waves cause unexpected disturbances. However, in all instances the trouble has been cured, even if the cause is not fully understood. It was so, too, years ago with aileron flutter, tail buffeting and similar phenomena.

Limited Usefulness

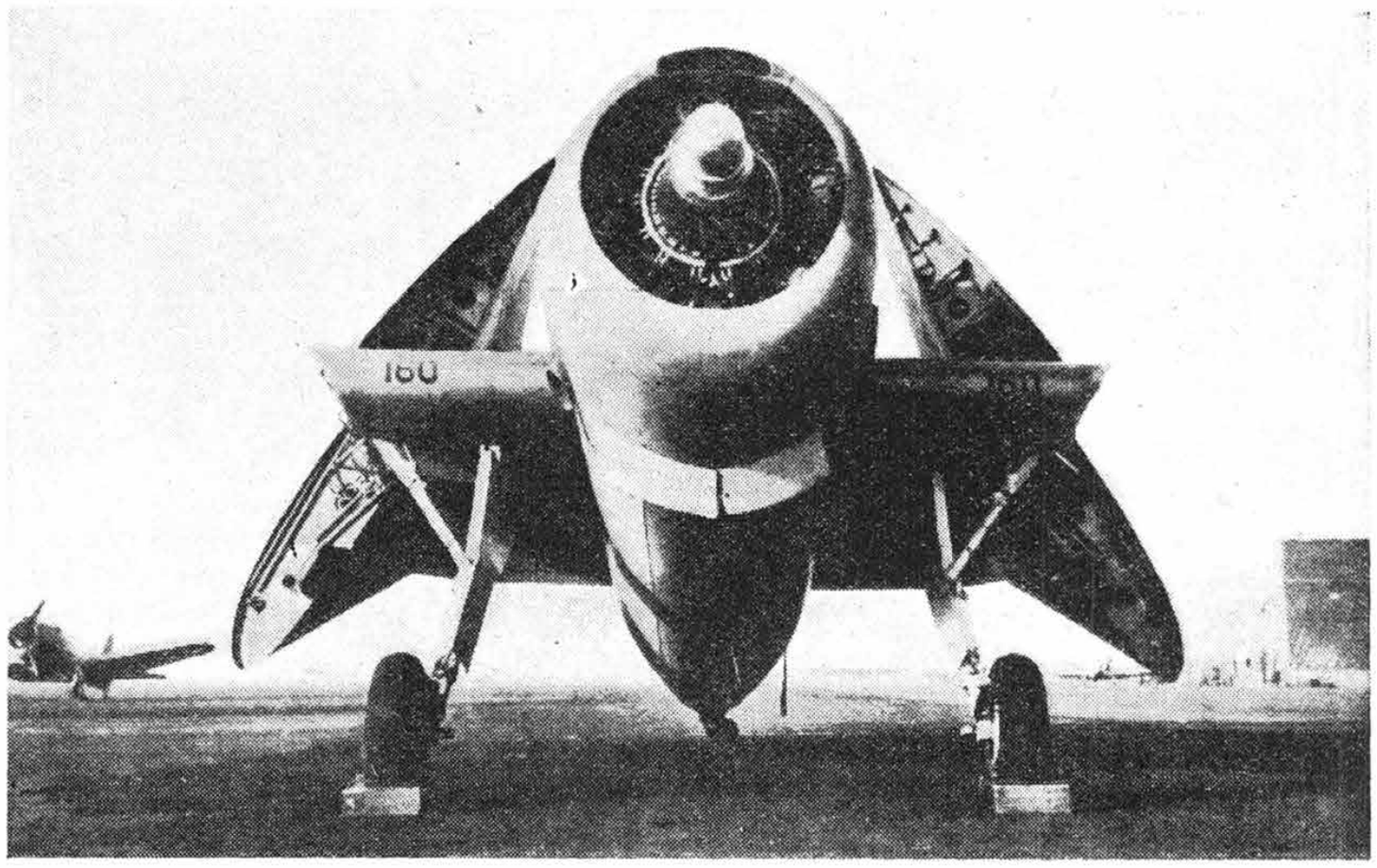
A type of aircraft which was at one time expected to do great things appears to have been pushed into the background. The troop-carrying glider, which its enthusiastic advocates thought would solve the problem of conveying soldiers to strategic points, has not figured largely in the war news, although gliders were used in the landings in Sicily. The notion of "trains" of gliders rushing troops to key points has not materialised, and in this country at any rate the view seems to be that airborne troops, either landed in the normal way or dropped by parachute, are a more practical proposition.

The success achieved by the Sikorsky experimental helicopter at one time led to the belief that this type of aircraft could do useful work in connection with U-boat spotting in the Atlantic. There is, however, a long way to go before the helicopter can carry a really useful load for any considerable length of time, and in the meanwhile the U-boat menace has become less serious, and it is more than doubtful that the helicopter will be developed and produced in time to be of real use in the Atlantic. That it will some day form a valuable addition to the types of aircraft of practical value there is little doubt. But that day has not arrived yet. Many schemes are "cooking," but it will be some time before the lid is lifted off the pot.

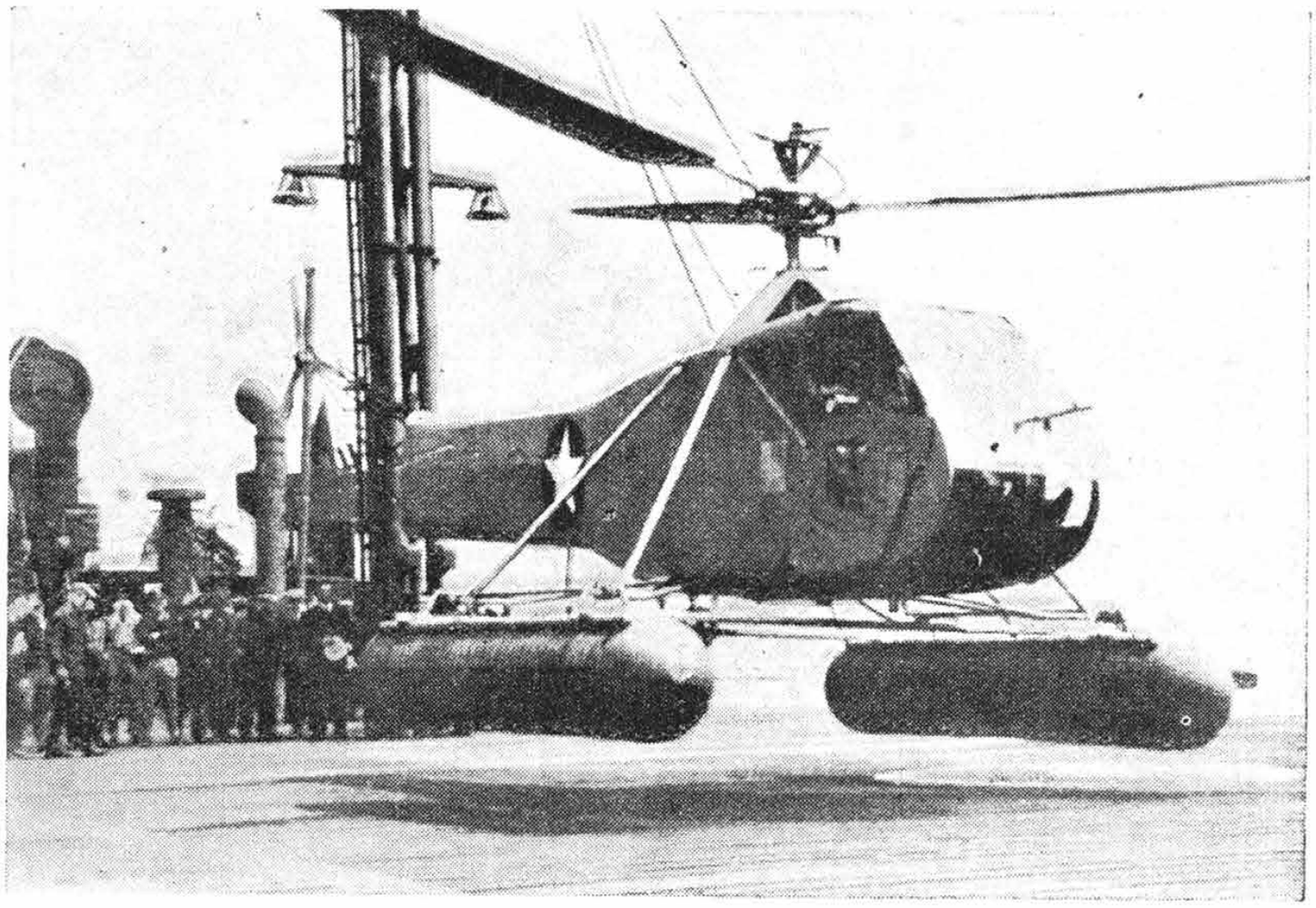
No startling developments in structural materials are to be recorded for 1943. Plastics continue to be used in relatively small sizes and for lightly stressed parts. They have not yet begun to take their place in the primary structure. It is interesting,



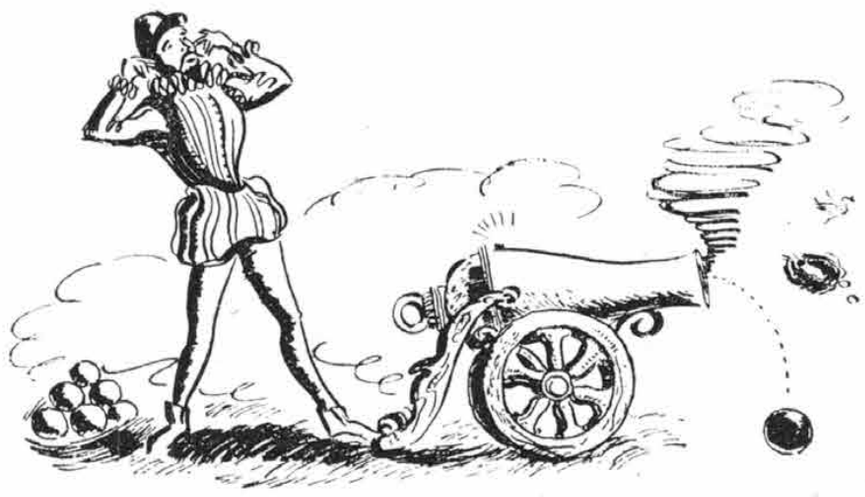
Bristol Blenheim V or Bisley is an outstanding example of over-development of a type. Blenheims I and IV were good aircraft ; the Bisley has nearly twice the wing loading of the original Blenheim.



It is customary for American shipborne aircraft to fold by raising the wing tips vertically. In the Grumman Avenger or Tarpon, however, the wings swivel and hinge on the rear spar.



The Sikorsky R4 helicopter, shown here landing on a 20ft.-square deck, is the first helicopter ever to go into production for military purposes.

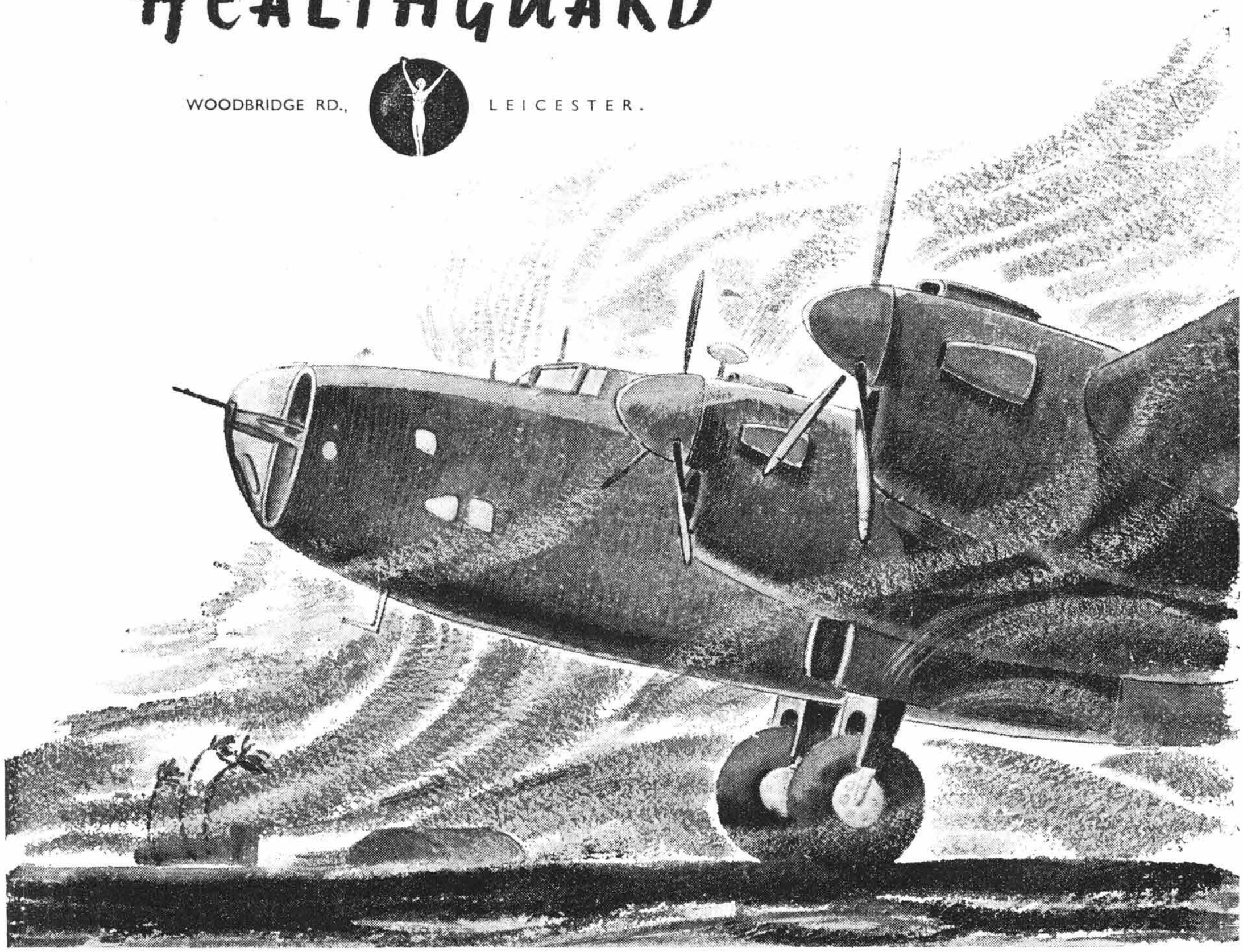


Just too bad...

Yes . . . just too bad . . . and one can imagine so vividly all the thought and care which went into the priming of that cannon, careful preparations which, for those days, are indeed comparable with the immense amount of research and toil which, these days, is necessary to produce our modern flying artillery.
It seems such a shame that these magnificent bombing planes then have to stand at dispersal where sand and snow may so quickly ravish a delicate adjustment . . . where wind and rain will do their worse to a precision instrument . . . yes, just too bad . . .

HEALTHGUARD

WOODBRIDGE RD., LEICESTER.



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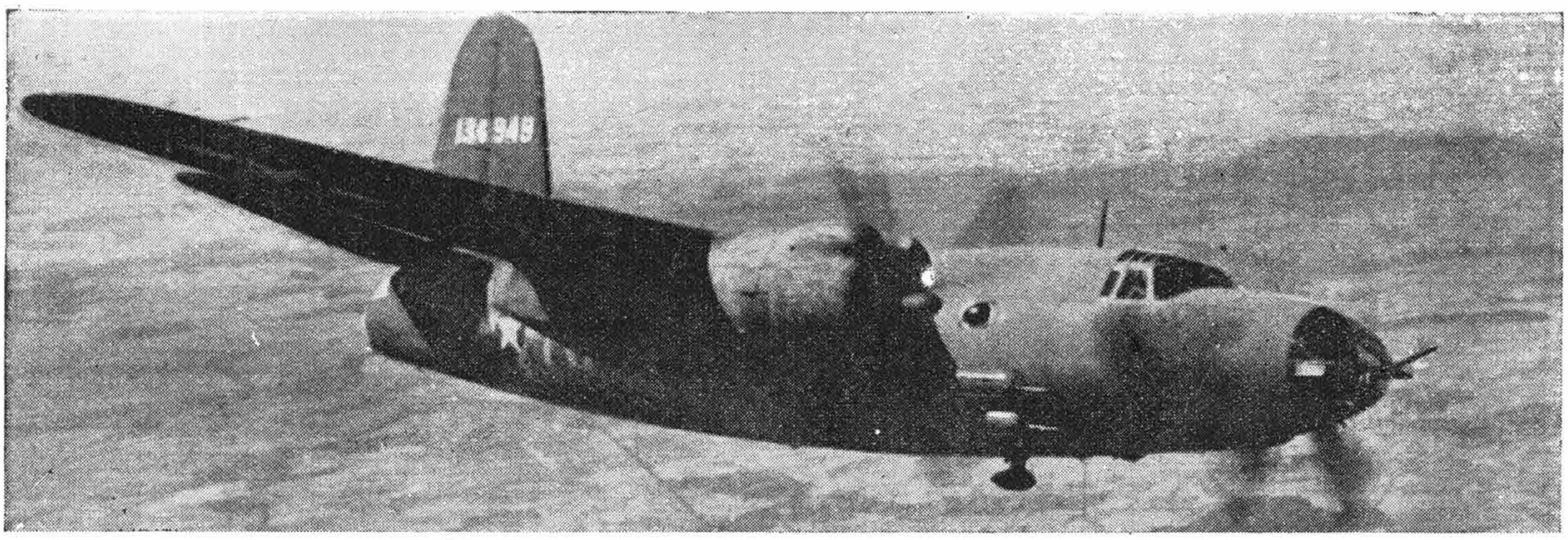


Military aircraft of to-day have wing loadings which would have appeared impossible a few years back. The Marauder, shown above, overstepped the mark in this respect and its span had to be increased.

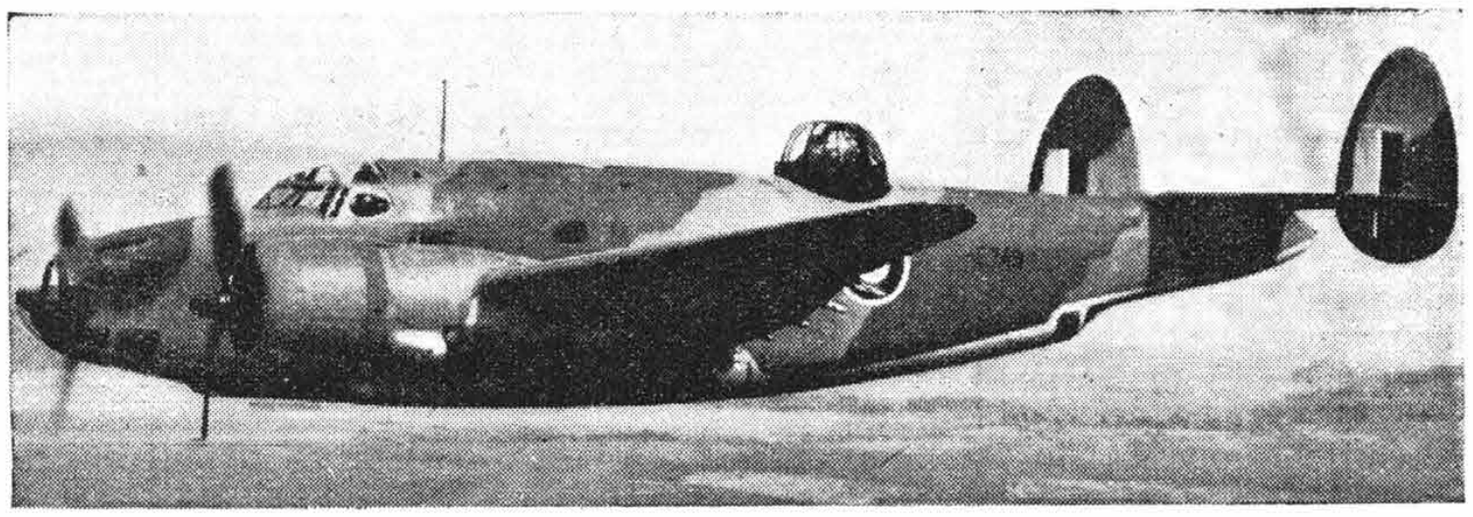
LOOKING BACK

in connection with materials, to reflect that the de Havilland Mosquito has amply demonstrated that wood construction is capable of standing up to the strain of wartime flying quite as well as metal. When damaged, such as by gunfire or through "belly landings," it behaves pretty much in the same way as metal. Of course, the high speed of the Mosquito is "kind" to the wood in that these machines are rarely hit badly and still more rarely brought down.

In the field of airscrew development the tendency has been towards a greater number of blades. The contra-rotating airscrew is not yet in general use, but a step towards absorbing efficiently the great horse-power of modern engines at heights has been the four-blader.

Reaction Propulsion

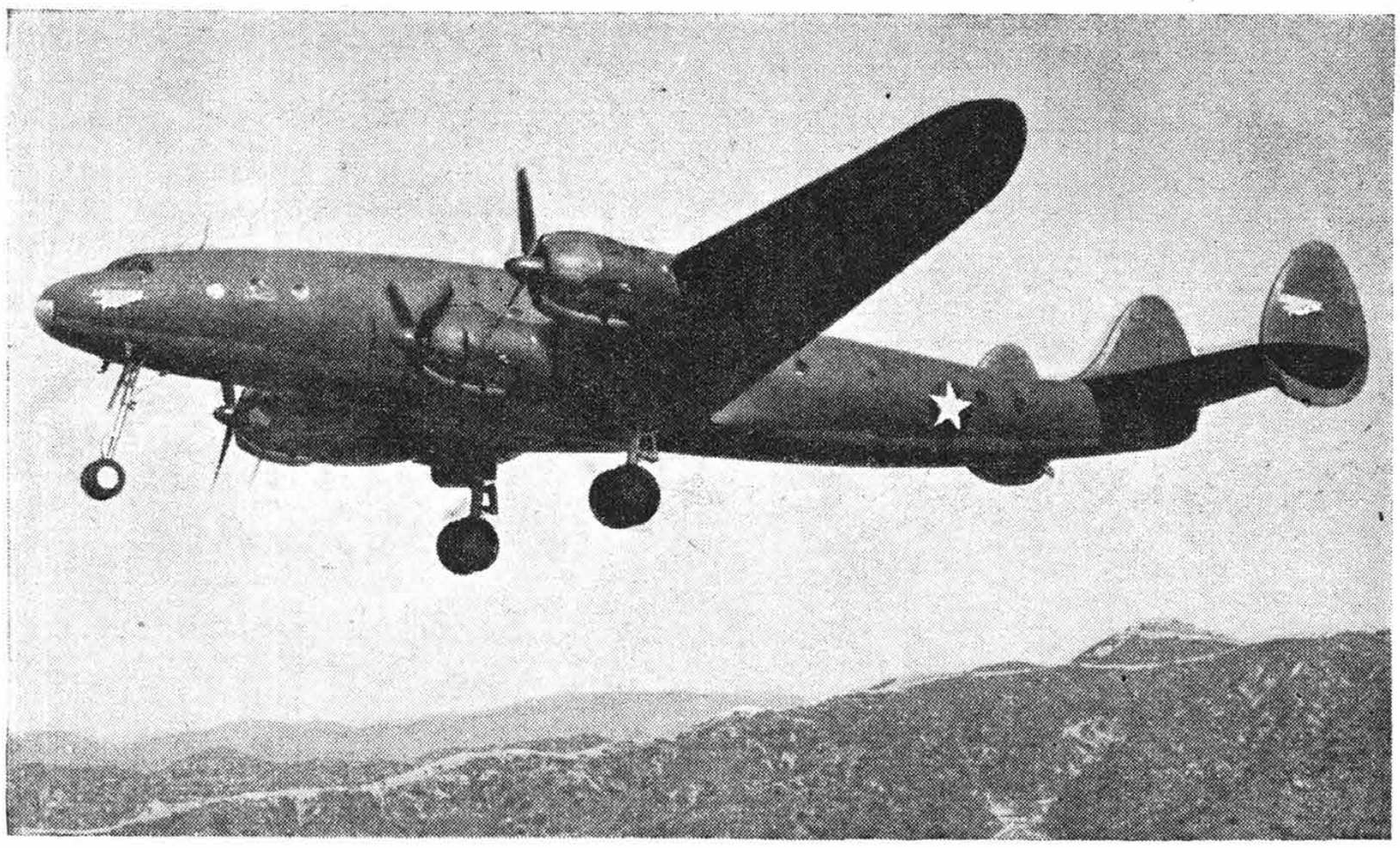
During 1943 there has been great interest in the subject of jet propulsion. There is no slacking off in the work of developing still better and still more powerful reciprocating engines, but the view is spreading that a more direct and less complicated form of propulsion will be the ultimate solution, at any rate for very high-speed aircraft. *Flight* may claim to have done a good deal of propaganda work in this direction by publishing articles on the various aspects of the subject, so that our readers are well informed about the fundamental principles involved.



The Lockheed Ventura is adapted to carry either bombs, depth charges or torpedoes. Much of the operational experience gained of the Hudson went into its design.

The most startling development in aircraft armament was the introduction of 75 mm. cannon in the North American Mitchell. Our American friends and allies are to be congratulated upon having solved the recoil problem. In this country we have not, so far as is known from official announcements, advanced beyond the Vickers 40 mm. cannon, but the tendency is towards heavier and heavier calibres, although our bombers are still armed with a multiplicity of 0.303in. machine guns and most American types with the 0.5in. Lord Beaverbrook's "bigger and better" bombs have reached the 8,000 lb. stage, although it appears that most of the heavy damage is being done with the 4,000 lb. "cookies."

One interesting and significant feature of 1943 was the revival of interest in commercial aviation. Many unofficial bodies and committees issued their views on post-war civil flying, and the Government was prodded by both Houses of Parliament until a long overdue Empire air conference was held, presided over by Lord Beaverbrook, who has since been given the task of organising and directing the planning



Lockheed's new super-transports, the Constellation, flew for the first time in January, 1943. It can carry 55 seated passengers in addition to a crew of nine.

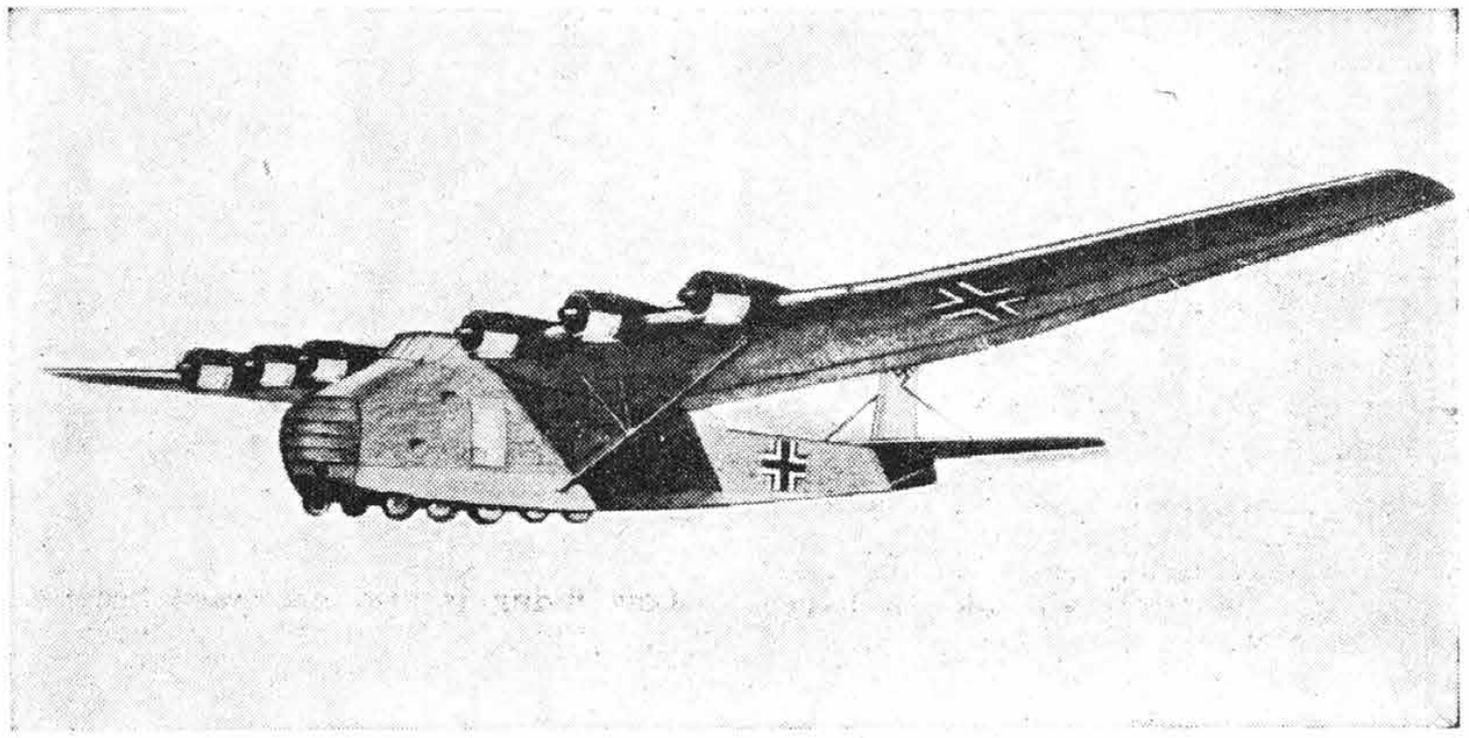
LOOKING BACK

Another agitation, in which *Flight* has taken its part, related to the training of technical personnel for the aircraft industry. Sir Roy Fedden came back from his mission to America full of enthusiasm for the grand scale on which the United States treats technical training and research, and meetings were held at the Royal Aeronautical Society to discuss what could and should be done. The Government asked the Aeronautical Research Committee to look into the matter and make recommendations, and as a result Sir Roy Fedden was asked to form a committee to study technical training.

British Achievement

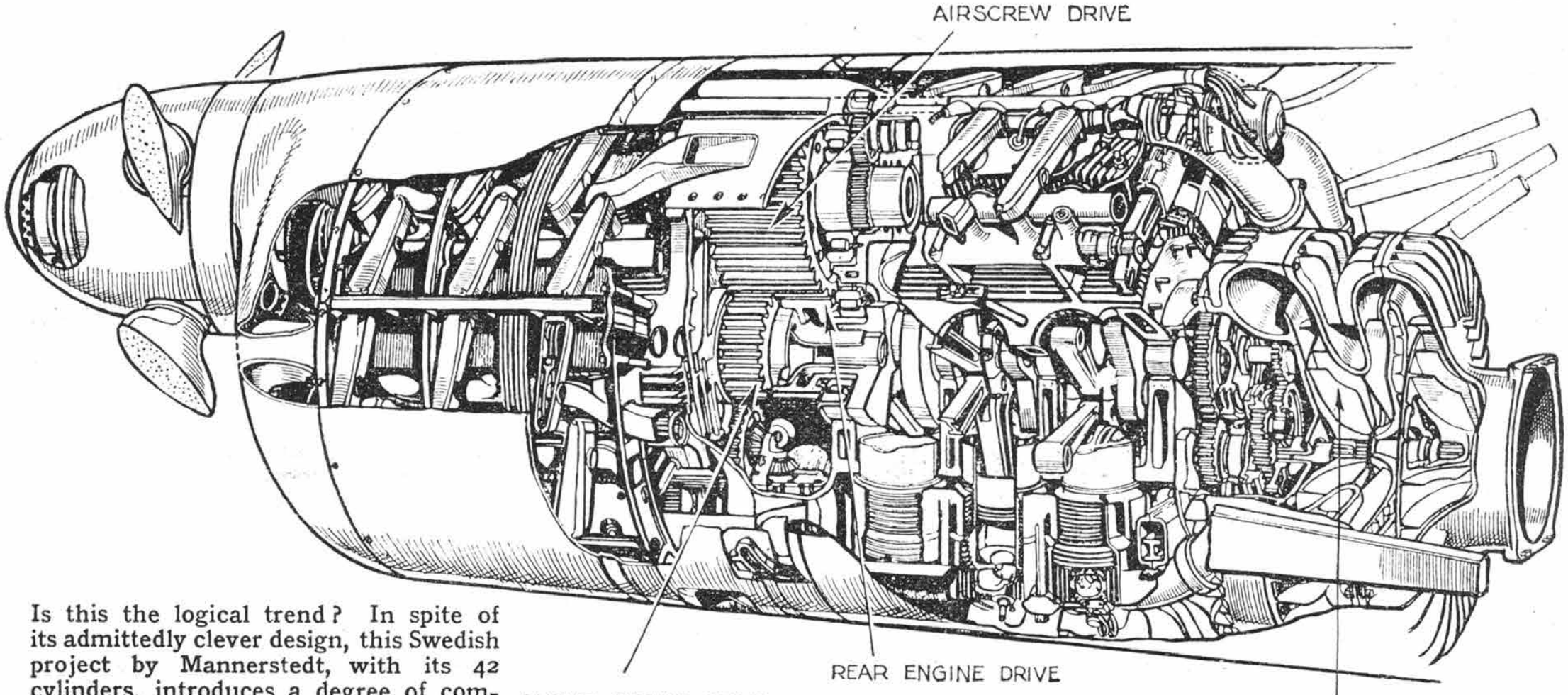
Looking back upon the year that has just closed, there is much in which we can take pride, certain aspects which give less cause for satisfaction, and a few items which need more attention than they have received. Production of aircraft and engines has been remarkably good. The only, or at any rate the main, fault one can find with that is the reticence shown by the Ministry of Aircraft Production in "telling the world" something of what has been achieved. Our good friends the Americans are so much better at that sort of thing, and the result has inevitably been that Great Britain's contribution is very far from being as fully appreciated as it deserves to be.

Not unconnected with the excellent production rate is the long gap which still exists between the first flights of a prototype and the going into service of the production machines. That there are difficulties in stopping quantity production of an existing type may be granted, but there is a tendency to "hang on" too long.



Hampered by bad communications in Russia the Germans developed the "Giant" Messerschmitt 323. As would be expected of a purely utility type it has a low wing loading and a high power loading.

Dismantling a Messerschmitt 410 in Italy. The Me 410 can be considered as the German reply to the Mosquito, but, in addition, it can be used for dive-bombing.



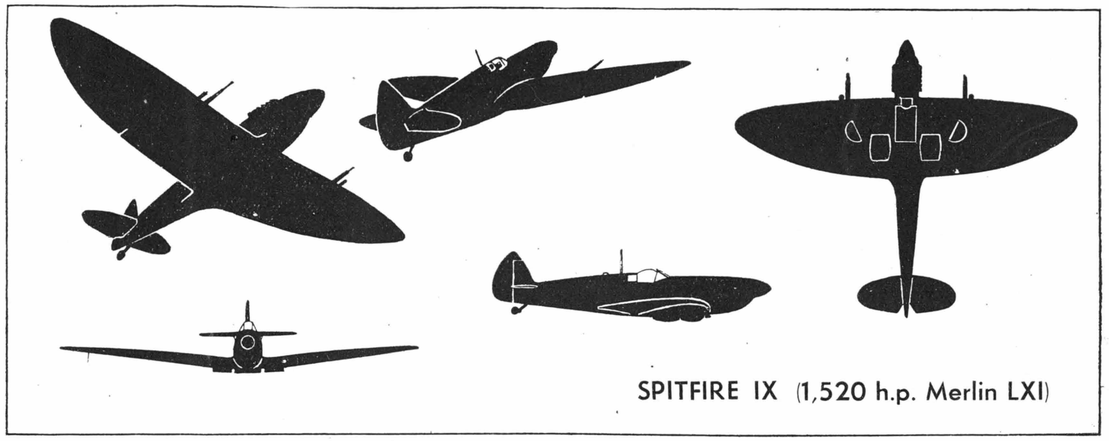
Is this the logical trend? In spite of its admittedly clever design, this Swedish project by Mannerstedt, with its 42 cylinders, introduces a degree of complication which makes one sigh for the day of jet propulsion.

The **LANCASTER**

AVRO

Studies in Recognition

Aircraft in Flying Attitudes

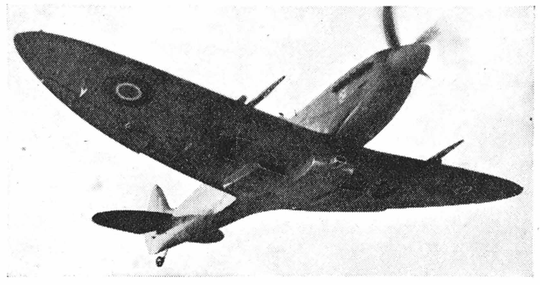


SPITFIRE IX (1,520 h.p. Merlin LXI)

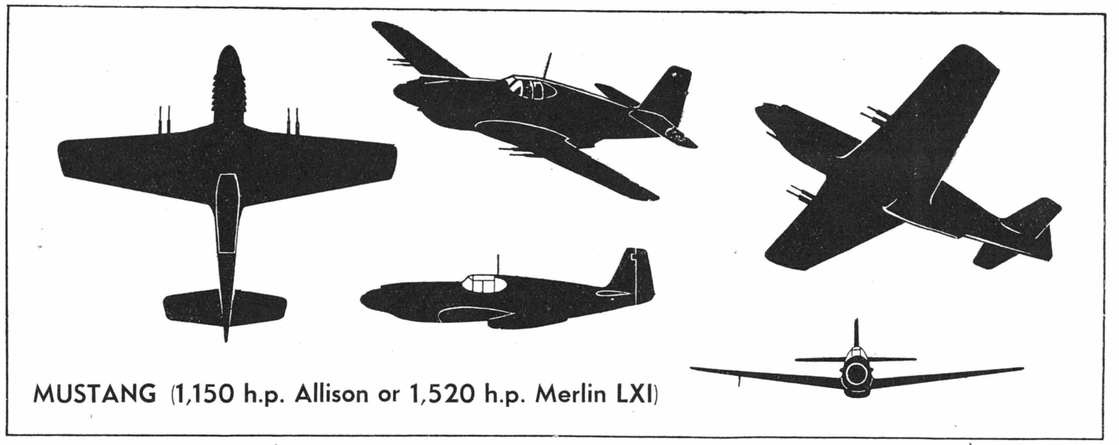
THE outstanding difference between the Spitfire IX and earlier marks of this famous single-seater fighter is its Rolls-Royce Merlin LXI engine, which has a two-stage, two-speed supercharger and intercooler, which maintains its performance up to 40,000ft. Top speed exceeds 400 m.p.h.

It also embodies certain modifications to the airframe. To accommodate the Merlin LXI engine the nose had to be lengthened. Other modifications include a lower drag cockpit hood and a straighter leading edge to the wings. The most obvious recognition point, however, is the presence of two radiators, one under each wing.

Armament of the Spitfire IX consists of two 20 mm. cannon and four 0.303in. Browning machine guns in the wings. Provision for two more cannon is shown by the small protrusions alongside the existing cannon. An auxiliary "slipper" fuel tank is carried under the centre-section. Dimensions: Span 36ft. 10in., length 31ft., height 11ft. 5in., wing area 242 sq. ft.



Supermarine Spitfire IX Single-seater Fighter.

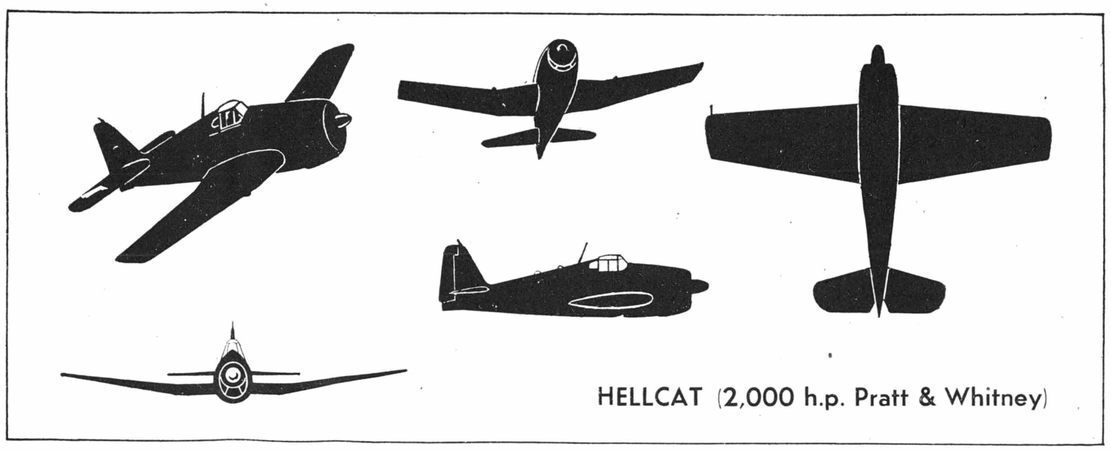


MUSTANG (1,150 h.p. Allison or 1,520 h.p. Merlin LXI)

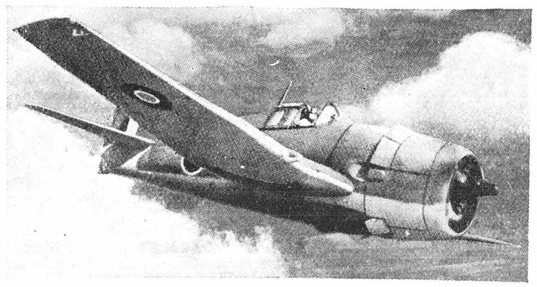
North American Mustang (P.51), Single-seater.

ORIGINALLY powered by a 1,150 h.p. Allison engine and armed with four 0.5in. and four 0.303in. machine guns, the latest type is fitted with a Packard-built 1,520 h.p. two-stage Merlin and is armed with four 20 mm. cannon. In the U.S.A.A.F. the two types are designated P-51 and P-51B respectively. The former, which may be said to have served its apprenticeship with the Army Co-operation Command of the R.A.F., has done excellent work on high-speed reconnaissance and low-level attacks across the Channel. The latest Mustang, however, by virtue of its two-stage supercharger, can perform on comparable terms with the best of single-seater fighters. Top speed of the P-51B is about 400 m.p.h.

Points for recognition include long slim nose, straight tapered wings and tailplane with square tips, angular fin and rudder, and radiator under centre of fuselage. Dimensions: Span 37ft., length 32ft. 2½in., height 8ft. 8in., wing area 235.75 sq. ft.



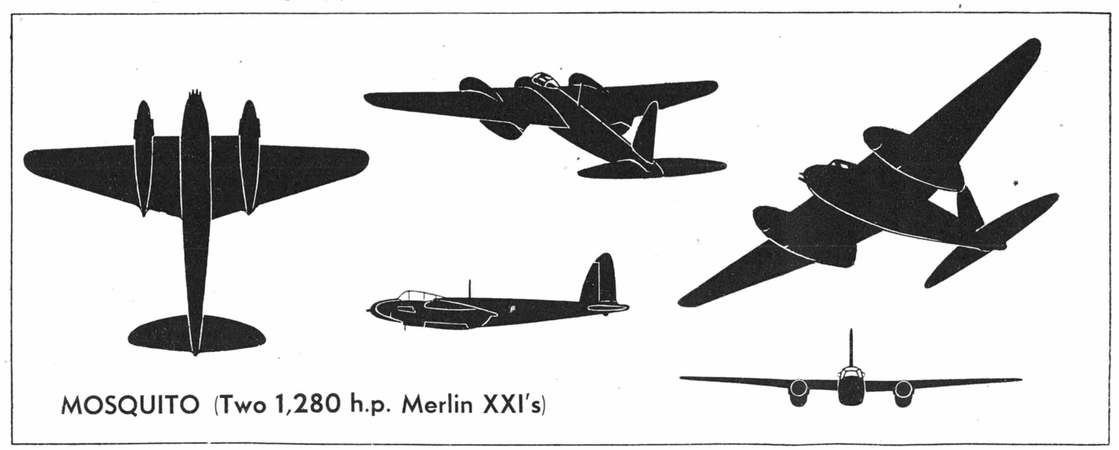
HELLCAT (2,000 h.p. Pratt & Whitney)



Grumman Hellcat (F6F-1) Single-seater Fighter.

VERY similar in general lines to the Martlet, or Wildcat, of which it is a development, the Grumman Hellcat (F6F-1 in the U.S. Navy) is a carrier fighter now also in service with the Fleet Air Arm. It is said to be armed with 0.5in. machine guns, though cannon may also be fitted. Like its friendly rival, the F4U Corsair, it is powered by a 2,000 h.p. 18-cylinder Pratt and Whitney Double Wasp engine, and has a top speed in the region of 400 m.p.h.

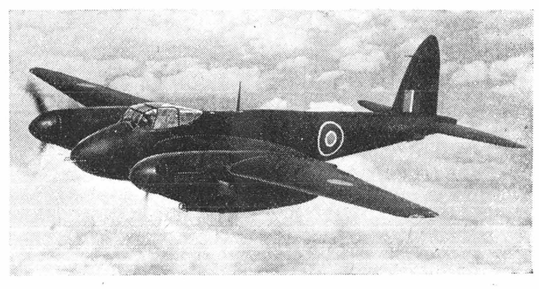
Besides being some 5ft. greater in span and length than the Wildcat, the Hellcat differs in being of the low-wing type, with a flat centre-section carrying a backwardly retracting undercarriage; previous Grumman designs incorporated an undercarriage which retracted into the belly of the fuselage. Cowling and fuselage are oval in section, the former having a crescent-shaped air-intake below the airscrew hub. Dimensions: Span 42ft. 10in., length 33ft. 7in., height 13ft. 6in., wing area 297.6 sq. ft.



MOSQUITO (Two 1,280 h.p. Merlin XXI's)

NOTABLE for its unique wooden airframe, the D.H. Mosquito is powered by a pair of 1,280 h.p. Rolls-Royce Merlin XXI engines (the Merlins of the Canadian model are Packard-built), but beyond the fact that its top speed is in excess of 400 m.p.h., no performance figures have yet been released. The version illustrated here is the fighter which has an armament of four 20 mm. cannon and four 0.303in. Browning machine guns fixed in the nose. Fighter-bomber and bomber versions stow their bomb-loads internally, and all models may be fitted with long-range drop-tanks outboard of the nacelles beneath the wings.

Points for recognition include large underslung nacelles extending behind trailing edge, sharply tapered wings with small round tips and advanced centre-section leading edge housing radiators, elliptical tailplane and tall single fin and rudder. Dimensions: Span 54ft. 2in., length 41ft. 2in., height 17ft. 3in., wing area 420 sq. ft.



De Havilland Mosquito Two-seater

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

New Fuel

SATISFACTORY results are reported to have been obtained in Finland with a new type of fuel, also suitable for gas producers.

The new fuel, which is described as lignine, is a by-product of wood sugar.

Estimate

ACCORDING to a German estimate, of 1,500 Soviet aircraft said to have been destroyed by the *Luftwaffe* during October and November on the southern sector of the Russian front, only 112 were American "Airacobra" types.

Change-over

THE manufacture of pre-fabricated huts has been developed in Germany in recent years for the quick erection of concentration camps and housing for the German Labour Corps and for foreign workers. The organisation is now reported to be employed on the rapid construction of accommodation for the bombed-out.

Air Support

GERMAN reports say that *Luftwaffe* transport units have a specially important task on the Nevel front. Transport aircraft have to fly to the very front line because these advanced German positions cannot be supplied from the ground, since in their rear—says a German commentator—are dispersed enemy troops or partisans who intercept their supplies.

The Ju 52s have certainly a tough job. Weather conditions in this sector of the Russian front alternate between fog, blizzards and ice storms, and the machines, heavily loaded with ammunition, bread preserves and concentrates for horses have to fly at altitudes of 30, 50 and even 25ft. Sometimes the aircraft have to wait for a day for some improvement in the weather conditions.

Low flying is also necessary because of the difficulty in locating the isolated positions in a landscape which is a vast forest area, some parts of which are in German, some parts in Russian hands.

Precautions

THE German Food Controller announced that in order to counteract the effects of air raids on large German cities food concerns will be decentralised. Small retail shops will keep enough stocks for a week; in some cities for a fortnight. This—it is said—will prevent the disastrous consequences of a hit on the stocks of a wholesale dealer.

Brave Teutons

THE president of the Hamburg police has ordered that all able-bodied men must attend to their A.R.P. duties and are forbidden to repair to shelters when the alert is sounded.

This regulation has been made necessary because of many complaints that many able-bodied men take their luggage and disappear in bomb-proof shelters or leave the town as soon as the air becomes thick. In the Hamburg popular parlance these men are referred to as "Mr. Never-there."

Silkworms

STRENUOUS efforts are now being made in Germany and her satellite countries to increase the production of silk necessary for the manufacture of parachutes.

Model cultivation centres are to be set up all over Germany in order to impart the necessary knowledge to those breeding silkworms. All schools have been ordered to grow mulberry trees and breed silkworms and to co-operate in these efforts.

Similar efforts are being made in Rumania, where silk production for parachutes is given a high priority; to promote silkworm breeding the Government has appointed special travelling instructors.

PROVISIONS' BOMBS: Two types of container which the Germans drop by parachute to their isolated and forward units. (Left) A fresh-water container and (right) for food and light equipment.

Boy Labour

AN appeal which is chiefly directed to members of the Dutch equivalent of the Hitler Youth is expected to produce some more boy-power for the German war machine. Dutch youths from 14 to 17 years of age are being recruited for the German aircraft industry, and after a short period at a "selection camp" are sent to Germany under their own leaders. The so-called training period in German aircraft factories is to last from two and a half to three years.

Revival

THE enlistment of parachutists ordered by the Secretary of State for Air of the Fascist Italian Government is reported by the Swiss Telegraphic Agency.

Former instructors of parachutists' schools are invited to join up, and young men, between 17 and 25, are asked to volunteer. Among other qualifications candidates must be at least 5ft. 6in. tall.

The recruiting centre is stated to be the First Command, Squadra Aera, at Milan.

Bomber Effect

THE effect of recent raids on Berlin is reflected in many reports published in neutral countries.

"There was a general atmosphere as if the end of the world had come," says one neutral eye-witness. In the offices people concerned themselves almost exclusively with things which had nothing to do with work. There was little connection with the outside world, as the telephone was a long time in being repaired, and the post never arrived. Burned documents still bearing the label "very secret" are floating around Berlin. Banks had been destroyed, postal cheque offices closed, and the entire business life of the city—reports a Swiss journal—had come to a standstill.

Particularly chaotic were the conditions of the transport system, and although only one week after the November 22nd raid the first train crossed the city, the last raid threw the Berlin traffic completely out of gear. Workers had to hitch hike or walk to their places of work, and journeys lasted many times longer than normally.

The food supply situation, too, was seriously dislocated. The central market and the meat market were burnt out, and supply by rail was impossible, so that everything had to be brought by car. After the raid on November 22nd, in many places in the centre of the city there was nothing to eat for days, as hardly any shop had anything to sell. With large bakeries burnt out and no gas supply, the restaurant and household catering was at breakdown.

A German report says that considerable difficulties have temporarily arisen in cold storage houses on account of the interruption of the gas supply, and substantial stocks of butter and other fats have been lost.

Truck loads of war prisoners, among them Italians, were brought to Berlin, but the Italians—complains a correspondent—only work when watched by German soldiers.

Invasion Air Command

Land and Air Commanders Appointed : Veterans from the Mediterranean in Charge

FOLLOWING promptly on the Teheran conference, Britain and the United States have selected the chief commanders of the Allied forces which are destined to liberate Europe from the German grip. It is not surprising that most of the prominent leaders in the Mediterranean have been chosen for the new, and we hope the last, campaign of the war. They are men who have proved themselves on land and in the air, and they above all other men ought to be able to lead the forces in the United Kingdom to the final victory. The West has become the most important front, and calls for the men who have proved themselves the best. At the same time there is heavy fighting still to be done in the Mediterranean, and other commanders, who have not yet had such good opportunities of winning the laurels of victory, have been put in charge there to finish off what is still a very important piece of work.

General Eisenhower is not an airman, but as supreme commander of the North West Africa Forces he has been generally responsible for the air work as well as for everything else. He evidently has a genius for getting men of different nationalities and different Services to work harmoniously together, and his appointment as Supreme Commander gives everyone confidence.

The same may be said about his deputy, Air Chief Marshal Sir Arthur Tedder. The significance of his appointment is discussed in the leading columns of this issue. Almost a book could be written about the man himself—and doubtless such a book will be written in due course. He is that somewhat rare combination, a scholar and a man of action; a writer and a leader of men. He has served as a regular officer in two of the three Services, and has written a notable historical essay about one aspect of the third. However, it will be better to take things in order.

Born in Stirlingshire in 1890, he was educated at Whitgift School and at Magdalene College, Cambridge. It was while he was an undergraduate that he won a University prize for an essay on the British Navy of the Restoration. One might have expected that this study of the Duke of Albemarle, Prince Rupert, and De Reuter would have inclined his thoughts to the Royal Navy, had it been possible for a Cambridge man to have obtained a commission in that Service. Anyway, he entered the Army with a University commission in 1913, and was posted to the Dorsetshire Regiment. Next year he was fighting in France as an infantry officer. In 1916 he was seconded to the Royal Flying Corps, and as a pilot was several times mentioned in despatches. In 1919 he transferred to the Royal Air Force. Later he saw some service in Turkey during the Chanak crisis in 1922.

Air Chief Marshal Sir Arthur Tedder, Deputy Supreme Commander.

There followed a series of appointments such as fall to the lot of every officer who holds a permanent commission in the R.A.F. The most interesting incidents of his inter-war years were a course at the Imperial Defence College, a period as a member of the staff of the R.A.F. Staff College at Andover, and in 1936 his appointment as A.O.C., Far East Command, with headquarters at Singapore.

It was actually a piece of luck which took him to the Middle East Command in 1940. Air Vice-Marshal Boyd had been appointed Deputy A.O.C.-in-C. at Cairo, but while flying out to take up his appointment he was made a prisoner of war by the Italians. Tedder was then appointed in his place, and shortly afterwards he was chosen to succeed Sir Arthur Longmore as A.O.C.-in-C. Since then Sir Arthur Tedder has evolved the methods by which an Air Force can work to the best advantage as part of an Army, even though it remains a separate Service. When the Eighth Army joined up with Gen. Eisenhower's forces in Tunisia, Tedder became head of the whole Mediterranean Air Command, under Gen. Eisenhower, and also under Gen. Maitland-Wilson in the Middle East. Under him were three subordinate Commands, namely those in N.W. Africa, in the Middle East, and at Malta. His appointment as Deputy Supreme Commander under Gen. Eisenhower is a worthy recognition of brilliant qualities, and gives universal confidence.

General Carl Spaatz, Commanding U.S. Strategic Force.

Under Tedder, the N.W. Africa Air Forces were commanded by General Carl Spaatz. Earlier in the war he came to England to command the U.S. Army Eighth Air Force; but when the landing in N.W. Africa was decided upon, he was sent there, handing over the Eighth Air Force, to Lieut. Gen. Eaker. He divided his command into three, the Strategical, the Tactical and the Coastal Forces. Now he comes back to England to command the American Strategic Bombing Force operating against Germany. He brings with him recent experience of successful warfare, which is the best preparation a man could have for the important task that lies ahead of him.

Tedder's place in the Mediterranean is to be taken by Lieut. Gen. I. C. Eaker, who has built up the Eighth Air Force in the United Kingdom. He laid down a definite policy from the beginning, namely, that he would never incur greater losses than he could replace. As his forces grew he pressed farther and farther into Germany,

Lieut. Gen. I. C. Eaker, Air Commander Mediterranean Theatre.

Major Gen. J. H. Doolittle, Commanding U.S. 8th Air Force.

using ever larger numbers of Fortresses and Liberators, with escorts of Lightnings and Thunderbolts. The American policy has always been to bomb by day, and under General Eaker this policy has been carried out with admirable accuracy.

The Allied Air Commander - in - Chief under General Eisenhower is to be Air Chief Marshal Sir Trafford Leigh-Mallory. Comparatively young, Sir Trafford has had a brilliant career. In the Battle of Britain he commanded No. 11 Group of Fighter Command, which was chiefly responsible for the defence of the London area and the Home Counties. When Sir Hugh (now Lord) Dowding relinquished his appointment as A.O.C.-in-C., Fighter Command, he was succeeded by Sir Trafford. Under him the Command has passed from defence to the unexpected role of offence. The fighter sweeps across occupied France and the Low Countries have been carried out almost daily. Sir Trafford has proved himself a dashing and also a highly skilful handler of air squadrons and Groups, and lately he has had under his command the newly formed Tactical Air Force. The Army can count on good air support from Sir Trafford when the day of invasion dawns. He has been commandant of the School of Army Co-operation, which taught tactical reconnaissance and spotting for the guns. Incidentally, he was at the same Cambridge College, Magdalene, as Sir Arthur Tedder. Magdalene seems to make a speciality of turning out good air commanders.

Air Chief Marshal Sir Trafford Leigh-Mallory.

The U.S. Army Eighth Air Force will not disappear with General Spaatz's appointment. In place of Lieut. Gen. Eaker it will receive as its commander an inspiring leader in Maj. Gen. James Doolittle. In 1925 British air sportsmen almost hated the name of Doolittle, because he won the Schneider Contest despite the efforts of the Gloster and Supermarine companies, and the piloting skill of Broad, Biard and Hinkler. Then nobody suspected that in the Supermarine 4 monoplane which fluttered and crashed they were looking at the ancestor of the Spitfire. Since then General Doolittle's raid on Tokyo has aroused universal admiration, and under him the N.W. African Strategic Air Force has performed brilliantly in Tunisia, Sicily, Italy, and adjacent parts.

Lately that Strategic Air Force was split into two, and the latest formation was the Fifteenth Air Force. Lieut. Gen. Nathan Twining has been chosen to command it. He has lately been commanding the U.S. Army Air Force in the Solomons, where the air has certainly been the arm on which General MacArthur has placed most reliance. Early this year General Twining spent six days on a raft in the Pacific before he was rescued. He has accordingly had recent and highly successful fighting experience, and will doubtless help to finish off the work against the underbelly of the Axis in a style worthy of his predecessors.

Post-war "Transition" Aircraft

MILITARY aircraft will not flood the aircraft market when the war is over, Edward C. Wells, chief engineer of the Boeing Aircraft Co., told the Society of Automotive Engineers in Chicago recently. The airlines will not be able to afford the high cost of operations of these aircraft when compared with the kinds of aircraft which will be available to airlines shortly after the war is over, Wells said.

In charge of design development for the past several years on the Boeing Flying Fortress, the recently announced Boeing B-29 Super-Fortress, and other Boeing aircraft, Mr. Wells described a future "ship" which he designated as "Airplane A," capable of carrying 100 passengers across great distances at fares which, according to his charts, will compare favourably with those for present railway coach or bus accommodations.

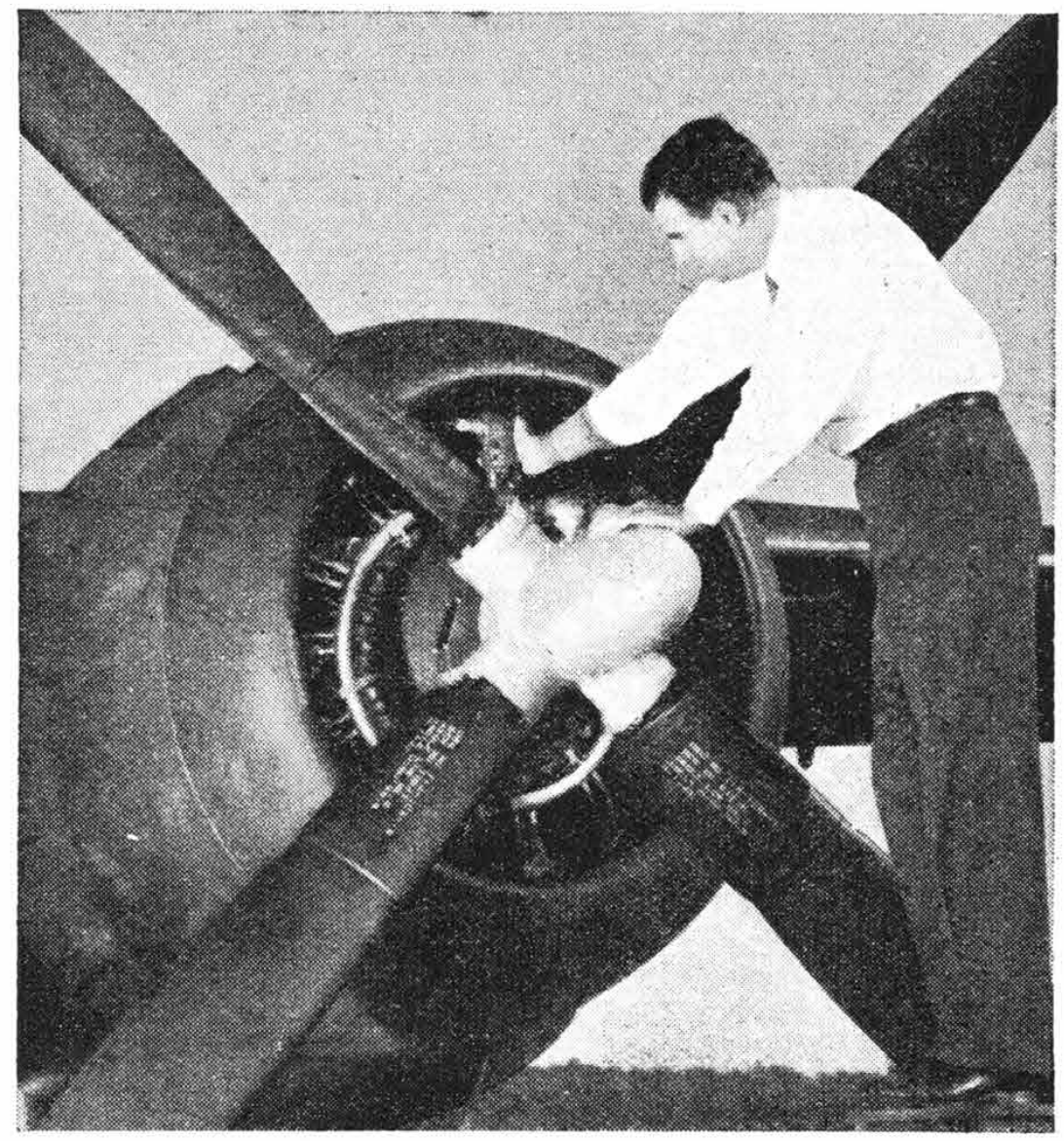
Even if the Government were to give its military transports, cargo carriers, and military combat aircraft to the airlines, and subsidise the conversion of these machines to make them equal to present airline equipment, the operators would not be able to use them as economically as they might the new type aircraft which will be available after a transition period of one or two years. However, conversion of some military craft will be necessary, Mr. Wells pointed out, to enable airlines to continue operations and to expand normally until the new types are completed.

This "Airplane A," as Mr. Wells chose to call it, would be so designed that airlines might readily convert it into a cargo carrier, which would make possible air cargo rates about one-third of the present rate for this service. This is between the present parcel post rates, which vary from 10 cents per ton-mile on the longer distances to 34 cents per ton-mile for hauls from 150 to 300 miles. Express rates are also in this same price category.

Cost Limitations

Referring to well-documented figures, technical information and charts to demonstrate his points, Mr. Wells went into considerable technical details on present airline operations cost, and the limitations of present types of aircraft for commercial uses. Because of regulations governing take-off and landing loads, a two-engined aircraft will compare favourably, on the economy basis, with a four-engined type at ranges up to 400 miles. Beyond this point, however, as range is increased, the payload of the twin-engined aircraft is reduced by an equivalent weight in fuel.

Speaking as the chief engineer of the firm which developed such four-engined aircraft as the Flying Fortress, the Stratoliner and the Boeing 314 Clipper, Wells pointed out that a four-engined aircraft has greater reserve power available for take-off, and can consequently carry more fuel. Take-off load, he said, is governed by the amount of weight with which an aircraft can climb should one engine fail during the take-off. With a two-engined aircraft, half the power is lost, while on a four-engined aircraft only a fourth of the power is lost. This gives the four-engined type a distinct advantage.



AUTO-SYNC.: George W. Brady, chief engineer of the Curtiss-Wright airscrew division, demonstrates how a small alternator (indicated by his right hand) on an aircraft engine controls the newly developed Curtiss Automatic Engine Speed Synchroniser. This device enables the pilot of a four-engined aircraft automatically to synchronise his engines by simply turning a small knob, and does away with the old method of adjusting four separate throttle levers one by one.

New Year Honours

Pioneer Designer Receives Knighthood : Many Royal Air Force Awards

KNIGHTS BACHELOR

Eric Vansittart Bowater, Dep. Controller, Repair, Equipment and Overseas Supplies, Min. of Aircraft Production.

Geoffrey de Havilland, Dir., de Havilland Aircraft Co., Ltd.

Air Vice-Marshal Norman Duckworth Kerr MacEwen, R.A.F. (Retd.), Chairman, Soldiers', Sailors' and Airmen's Families Assn.

Oliver Edwin Simmonds, M.P. for Duddeston, Birmingham, lately Chairman, a Committee on Brick Industry.

Capt. Geoffrey de Havilland —a Knighthood.

ORDER OF THE BATH—K.C.B.

Sir Harold Scott, Permanent Sec., Min. of Aircraft Production, lately Sec., Min. of Home Security.

C.B.

C. G. Caines, Asst. Under-Sec. of State, Air Min.

ORDER OF THE BRITISH EMPIRE C.B.E.

W. W. Hackett, Managing Dir., Accles and Pollock, Ltd.; P. H. Maggs, lately Assist. Sec., Air Ministry; N. E. Rowe, Dir., Technical Development., Min. of Aircraft Production; H. M. Woodhams, Dir. and Gen. Manager, Sir W. G. Armstrong Whitworth Aircraft, Ltd.

ORDER OF THE BATH ROYAL AIR FORCE K.C.B. (MILITARY DIVISION)

Air Marshal David Grahame Donald, R.A.F., Air Marshal Roderic Maxwell Hill, R.A.F.

C.B. (MILITARY DIVISION)

A.V-M. W. B. Cushion, R.A.F.; A.V-M. J. D. Breakey, R.A.F.; A.V-M. G. E. Brookes, R.C.A.F.; A.V-M. A. B. Ellwood, R.A.F.; A.V-M. R. O. Jones, R.A.F.; A.V-M. E. A. B. Rice, R.A.F.; A.V-M. C. R. Steele, R.A.F.; A.V-M. T. M. Williams, R.A.F.; Air Comdre. W. Elliot, R.A.F.; Air Comdre. A. C. Stevens, R.A.F.; Air Comdre. J. A. Stone, R.A.F.; Air Comdre. C. P. Symonds, M.D., R.A.F.V.R.

DOMINIONS OFFICE LIST

ORDER OF THE BRITISH EMPIRE M.B.E. (MILITARY DIVISION)

Sqn. Ldr. J. E. Marzorati, S. Rhodesia A.F.

K.B.E. (CIVIL DIVISION)

Guest, Col. the Hon. Ernest Lucas, Min. of Mines, Public Works and Air, S. Rhodesia, for public services, especially in inauguration of Empire Air Training Scheme.

ROYAL RED CROSS

PRINCESS MARY'S R.A.F. NURSING SERVICE

Members of the Royal Red Cross

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D.B.E. (MILITARY DIVISION)

Air Chief Commandant Katherine Jane Trefusis Forbes, W.A.A.F.

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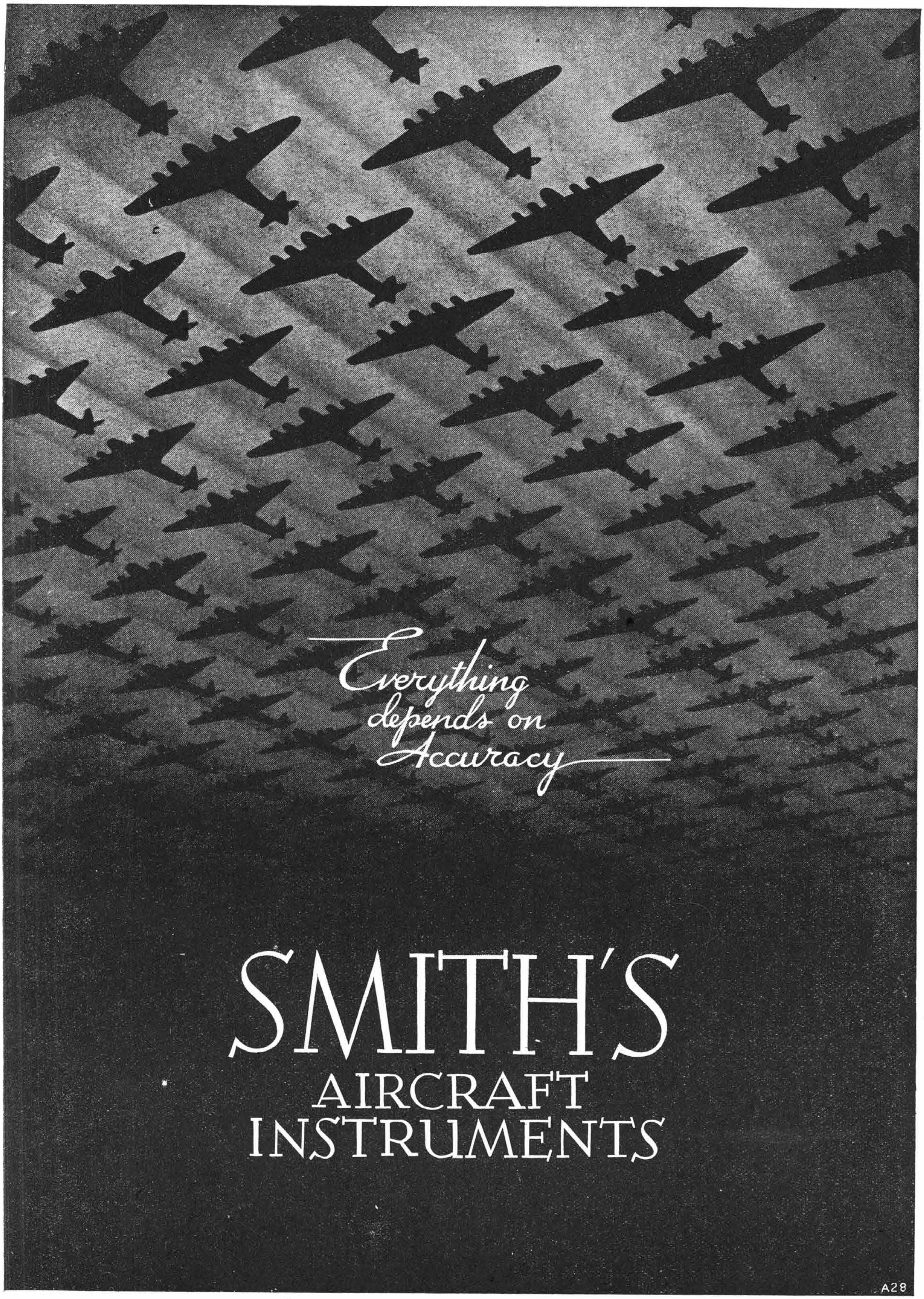
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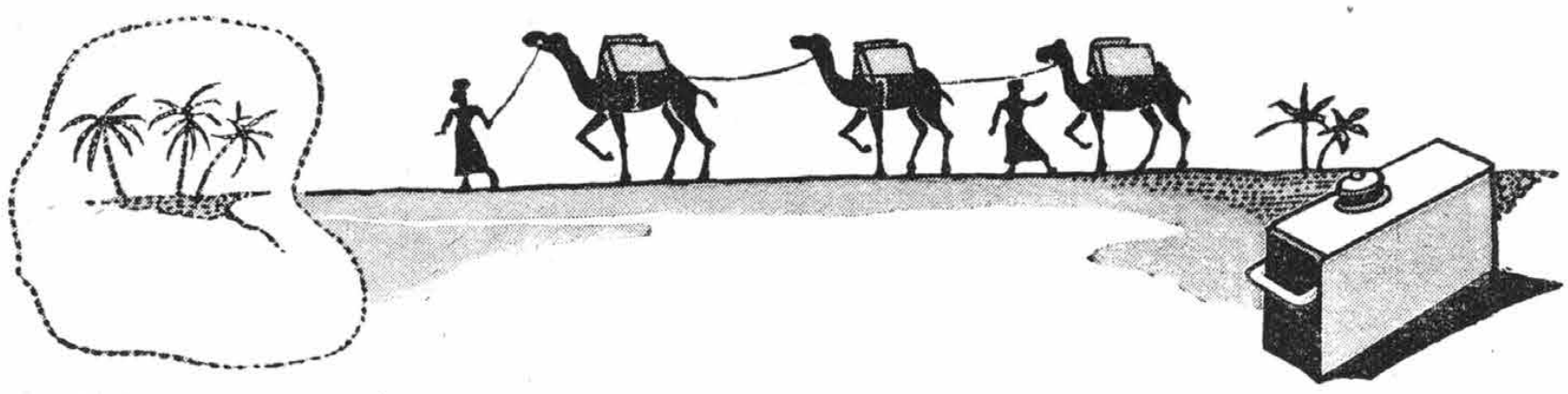

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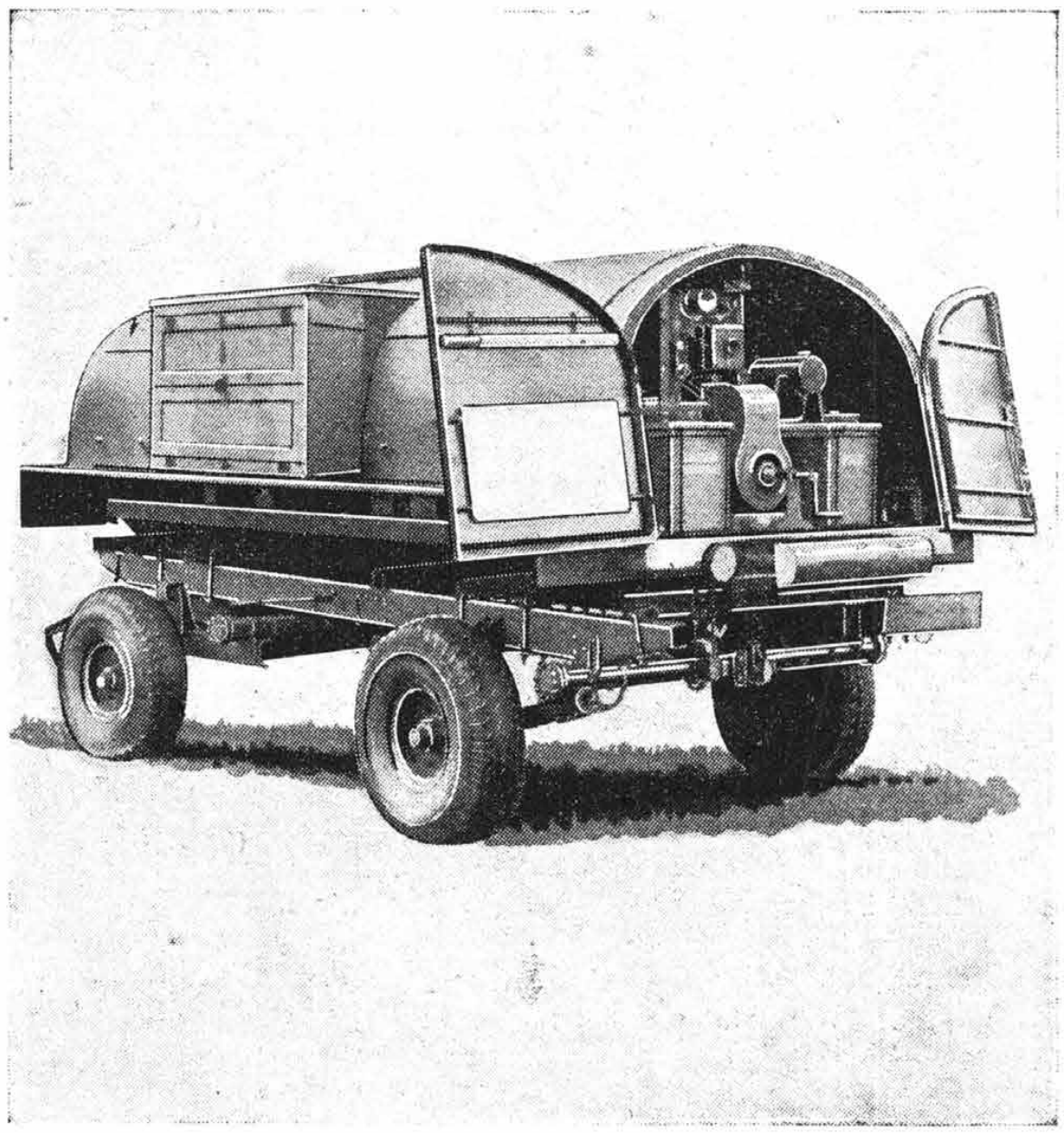

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(*To be continued next week*).

APPOINTMENT

CHIEF designer to R. Malcolm, Ltd., since he left the Fairey Aviation Co. in 1940, Mr. M. J. O. Lobelle has now been appointed a director of the firm.

THE 2,200 H.P. CYCLONE

DEVELOPMENT of the 18-cylinder two-row Cyclone engine to give a maximum of 2,200 h.p. has been announced by the Wright Aeronautical Corp.

This engine, formerly rated at 2,000 h.p., is reported now to be in quantity production in this latest form for the powering of new heavy, long-range bombers, though its first appearance is in the four-engined Lockheed Constellation (C-69) transport aircraft.

The new Cyclone-18, with a piston displacement of 3,350 cu. in., retains the overall diameter of 55in., which is the same as that of the original nine-cylinder single-row Cyclone of 525 h.p. introduced in 1927.

Either gear-driven or exhaust turbo-supercharger may be used, and in order to keep down the airscrew tip speeds within efficient limits, an unusually low reduction gear is employed to drive the large, broad-bladed airscrew at less than half crankshaft speed.

PROMOTIONS GAZETTED

AS announced in a recent issue of the *London Gazette*, the King has approved the promotion to the rank of Field Marshal (supernumerary) of Gen. Sir Alan Brooke, G.C.B., D.S.O., Colonel Commandant of the Glider Pilot Regiment, and the R.H.A., and A.D.C. General to the King. Sir Alan has been Chief of the Imperial General Staff from 1941.

The King has also approved the promotion of Air Chief Marshal Sir Charles Frederick Algernon Portal, G.C.B., D.S.O., M.C., to be Marshal of the Royal Air Force. He became Chief of the Air Staff in 1940.

Air Marshal Sir Trafford Leigh-Mallory's promotion to the acting rank of Air Chief Marshal on his appointment as Allied Air Commander-in-Chief under Gen. Eisenhower has also been gazetted.

Warming Up

Heating Aircraft Engines in Cold Weather : Portable Electric Heating Apparatus

By A. G. AREND

THE heating of aircraft engines in order that aircraft may be ready to take off at short notice during cold weather is a subject upon which comparatively little literature has appeared. In the ordinary way, it is customary to allow the engine to heat-up itself by the somewhat lengthy process of "ticking-over" and without artificial, or rather, outside assistance. This means that the engine is subjected to wear for no useful purpose, while fuel is dissipated wastefully. Whereas the necessary high-grade aviation fuel has to be imported from abroad, no such restrictions obtain with electrical energy, which with the existing grid system is readily obtainable. In view of these features, efforts have been made to improve on electrical installations and to adapt them so that with the assistance of a small portable set, the necessary heat will be available at all times.

In this work, advantage has apparently been taken of experience in the construction of modern air-cooling systems for electric-resistance furnaces which are necessary to reduce the temperature formed to the exact degree to suit the heat-treatment of magnesium alloys.

By operating in the converse manner, the heat derived from resistance heating is directly transmitted to the engine of the aircraft with a corresponding accuracy of temperature control. This small point is of importance since, irrespective of what weather conditions obtain, and what wind is blowing, the time necessary for heating-up can be predetermined with precision. When the warming is done by allowing the engine to "tick-over" for a considerable time in really cold weather, this time factor varies appreciably.

Air Insulation

The reason is that air is the greatest of all heat insulators, although it took many years for heating engineers to understand the subject. In Germany and Austria, prior to the war, an extensive business was undertaken not only of exploiting natural vermiculite, a waste rock which expands on heating, but of developing artifically prepared concrete of a porous variety which could be cut and sawn to provide desirable insulators. The advantage of numerous air-pockets was appreciated.

The practice of heating aircraft engines by "ticking-over" is the opposite of this policy, since almost unlimited quantities of air are meanwhile passing through the engine. There is thus little wonder at the fact that much time has to be wasted, since the greatest of all heat insulators has to be heated-up before the engine can be started up.

Where artificial or external heating is applied, each engine is first covered over with a tarpaulin in such a manner that the fabric is slipped within the space between the air screw and the engine without leaving any appreciable open spaces. At the bottom section of this cylindrical tarpaulin is a tubular mount into which is connected a flexible pipe-line, which usually enters near the bottom of the engine itself, so that the heat can rise in the approved manner. The flexible pipes, one for each engine, lead to the heating device mounted on wheels and standing on the ground.

These pipe-lines are specially insulated so as to minimise heat-losses. A cable from the nearest available power supply is connected to the sockets of the main power point. The connection is made at the end of the heating device, which is pushed from one location to another as required. A switchbox forms the front panel of the equipment, while the socket for the main current supply is carried at its lower end.

In order to accommodate various degrees of heating, different fuses and switches are provided in the interior, but great care is taken to see that arcing is prevented so as to make the outfit explosion-proof.

Immersion Heaters

Heating elements are provided in the form of groups of rods, the making and setting of which to ensure the maximum transference of heat has been the subject of intensive research. Air is driven over these groups of rods by means of an electrically driven fan. Arrangements are also made for linking up the apparatus with other portable equipment, by the use of three switched and interlocked double-pole sockets. In this way, oil in the crankcase can be warmed by the insertion of immersion heaters in the most direct manner, as distinct from transmitting hot air to the engine. All sockets are interlocked so that plugs can only be removed or inserted when the switch is open, thus avoiding any danger of accidents. By this universal means of application, all flexible pipe lines may if desired be connected to the one engine, as there are pipe mountings under the engine tarpaulins to accommodate them, or alternatively, the heat is applied in concentrated form to the immersion heaters.

Probably most attention has been devoted to the transfer of heat from the groups of rods since this is a transfer by contact, and it is desirable that as many air particles as possible shall be brought into intimate contact. When air travels close to a metallic surface, a layer is formed which possesses only a low velocity of heat flow, and hence the object is to prevent this layer from being initially formed, so that as many fresh particles as possible will make contact. This layer is destroyed, and heat transfer correspondingly promoted, each time the continuity of flow is interrupted. For this reason, although the curvature of the rods performs this interruption, the finer is the diameter to the perpendicular flow, the greater is the extent of disturbance, and the action is thus materially intensified the smaller is the diameter.

Controlled Heat Transfer

In view of the limited capacity of the interior of the heating device, the groups of rods are so constructed that the path taken by the air is comparatively short, but yet receives the maximum heat transfer. Eddies which form along the fine rods increase this heat transfer in a manner unknown to ordinary ribbed media. The extent of heating applied to the engine is thus not only controlled by the current input, but by the amount of air supply, and hence the temperature transferred is within the closest limits, and despite varying climatic conditions, can be judged to within a matter of minutes' duration. The groups of heating rods in earlier models had a total loading of 12 kW, and were contained within a lagged casing, but with the linking-up of different units mentioned, this can be increased as desired. This becomes more necessary when a strong wind is accompanied by very low air temperatures. Prior to the improved system of making and setting the groups of heating rods, three aircraft engines required some 25 minutes to raise from 0 deg. C. to a temperature sufficient to start up with ease, but details of the latest extent of performance have not so far been divulged.

Arrangements are made for the flexible pipe-lines and tarpaulins to be housed on the portable equipment, so that it may be run from place to place as required as a complete unit.

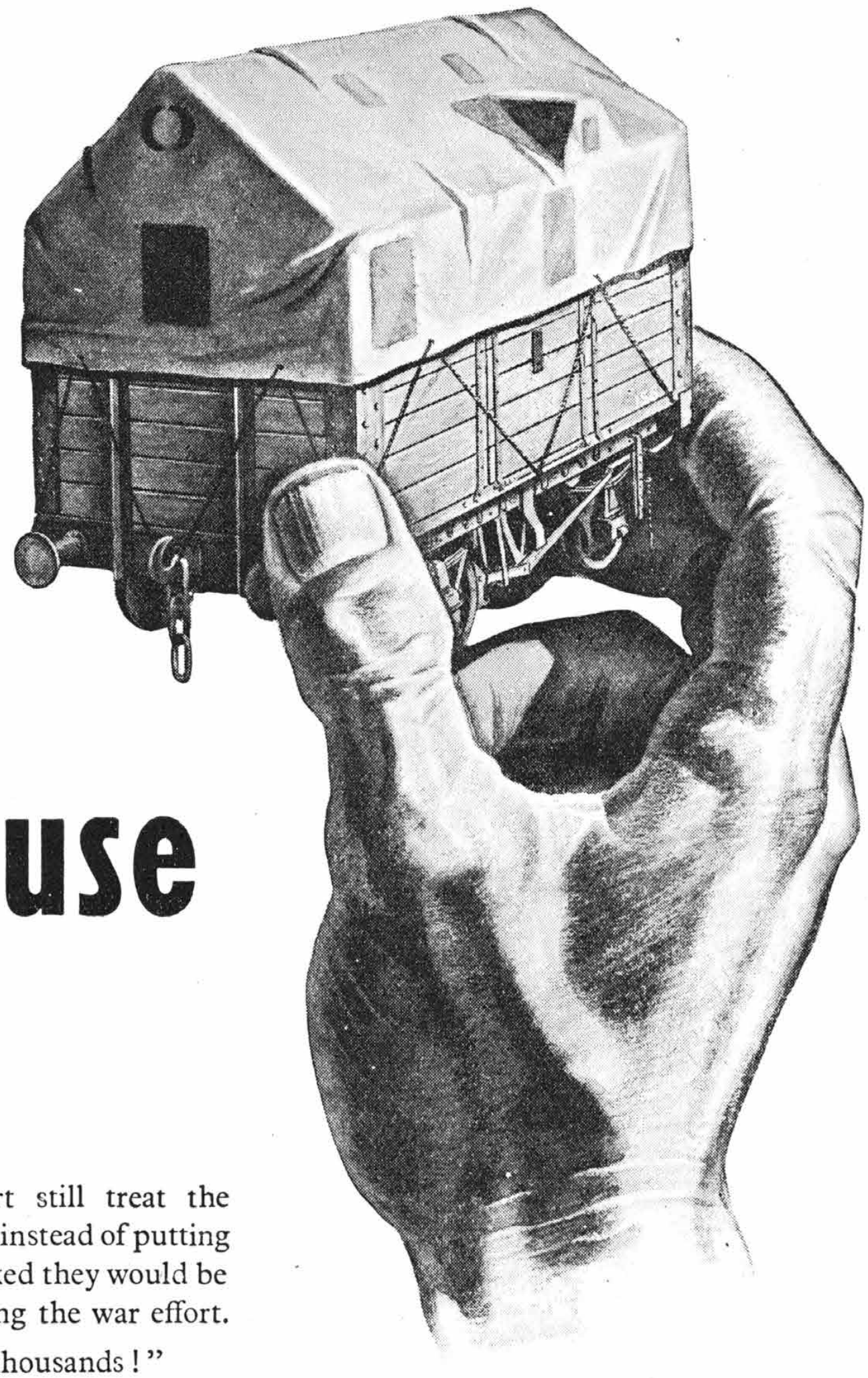
AIRSPEED

(1934) LIMITED

Designers and Manufacturers of
TRAINING TRANSPORT AND
SPECIAL-PURPOSE AIRCRAFT

Frank Wootton's fourth drawing shows an airborne attack developing. A flight of troop-carrying HORSAS is landing

WEALTH of experience in the evolution of transport aircraft enabled Airspeed to design and produce, in great quantity, the HORSA standard towed transport of British airborne forces. In turn, the solution of the special problems involved in its development has brought a further store of



Wagon or warehouse ?

TOO many users of transport still treat the nation's wagons as warehouses instead of putting them back into traffic. How shocked they would be if they were accused of obstructing the war effort.

"One wagon out of tens of thousands!"
"It was only three days at our sidings."

But *in total*, hundreds of wagons stand idle for thousands of days — a huge loss to our vital transport system in its colossal war tasks. Will you take steps now to see if you are an unwitting "offender"?

QUICKER TURNROUND THAN EVER BEFORE

Issued by the Ministry of War Transport

You know your own problems best. Tackle them in your own way. But tackle them now. Plan, encourage ideas, improvise if needs be. Here's a starting-off agenda:

1. *CLEAR LABELS AND DOCUMENTS.*
2. *LABOUR SAVING DEVICES.*
3. *WORK IN BLACK-OUT AND AT WEEK-ENDS.*
4. *OPINIONS OF "MEN WHO DO THE WORK".*

I

The Case for the Flying Boat

Note on Mr. C. A. H. Pollitt's Article, "Where Angels Fear . . . ." Published in "Flight," December 16th, 1943

By HENRY KNOWLER, A.M.I.C.E., A.F.R.Ae.S.

MR. C. A. H POLLITT'S comments upon the Saunders-Roe report on civil transport flying boats, published in the December 16th issue of *Flight*, raises several points upon which the brevity of the report precluded a more detailed explanation.

The field covered in the enquiry from which the summary was made touched upon every angle of flying boat use, and it must be confessed that criticism had been expected, indeed, it is welcome, since a thorough ventilation of such problems will lead to clarification.

The first point Mr. Pollitt discusses is the location of the main bases on world routes: this is a problem which must be settled very soon if rapid post-war turnover to civil transport is to be made.

IN his article Mr. Pollitt argued that the flying boat type loses on ton-miles of payload, that it gives only coast-to-coast transport, and that maintenance is difficult and costly. Mr. Knowler, who is chief designer of Saunders-Roe, replies to the different points raised by Mr. Pollitt. We hope other readers will take up the cudgels in defence of both the landplane and the flying boat.

It will be noticed that the proposed main routes are planned for stages ranging from 1,300 miles, point to point, up to 3,500 miles. The important main bases will, therefore, be few in number, and must be of large size whether they are for landplanes or flying boats. One can say right away that the British terminal must be situated a considerable distance from the metropolis, not only because a suitable large area with unobstructed approaches is not possible within the London area, but also because of the prevalence of fog there. It may be contended that, with post-war instrumentation, fog will not be a serious handicap. This might be true if the airport is only lightly used, but past experience indicates otherwise—all the organisation and systemised control of the railways is not sufficient to prevent lengthy delays resulting from a whiff of fog somewhere on the line. On the other hand, there are very big differences in the incidence of fog between districts, certain areas being almost free.

The main bases must, therefore, be remote from big cities such as London, and feeder services will have to be used for clearing passengers to their respective destinations. Under these circumstances, the flying-boat terminal can be considered as being as near as the corresponding airport. Obviously, the ideal would be to have both located adjacent to each other.

The next point mentioned by Mr. Pollitt is the advantage in shape of a rectangular fuselage compared with the conventional flying boat shape. It may have been noticed that all the flying boats quoted in the report are intended to operate at a height of 20,000ft. Obviously, a rectangular fuselage is not feasible, nor is the conventional flying-boat shape possible. The cross-section for pressurising must be either a circle, or a combination of circles, with flooring or ties at the points of intersection. If a circular section is used, it will be found that a flying-boat hull bottom can be included without serious distortion. It should be remembered that flying-boat bottoms are required to withstand pressures many times that required for pressurising, and are, therefore, already strong enough.

The maintenance problem—the final one touched upon by Mr. Pollitt—is admittedly one of the most important in the operation of flying boats. The scheme put forward in the Saunders-Roe report was only a tentative suggestion for a type of dock suitable for stages on the main routes. Something more ambitious should be designed for terminals. Maintenance staging must be made to suit the aircraft in use, and would be ground equipment. Platforms hingeing from the wings are found to be unsatisfactory in many ways, and the modern method is to attach light ladders and platforms to the engine nacelle only, leaving the wing leading edge structure undisturbed. In future aircraft, however, much of the installation will be maintained from the inside of the structure through access passages in the wings.

It will be fairly obvious to those with any knowledge of the subject that the handling of flying boats has been badly neglected in the past; in fact, almost the same methods are in operation to-day as those practised over 25 years ago. They have stood still while the flying boat developed.

The reason for this is probably financial, but is a "penny wise pound foolish" notion, since, in the long run, the saving in cost of maintenance and possible losses at moorings must outweigh the capital expenditure involved in the provision of suitable water areas and docking facilities.

BOOK REVIEWS

International Air Transport, by Brig. Gen. Sir Obborne Mance, K.B.E., C.B., C.M.G., D.S.O., assisted by J. E. Wheeler. Oxford University Press, 7s. 6d.

ISSUED under the auspices of the Royal Institute of International Affairs, this study of international air transport and communications covers its development, largely from the legal and political angle, from the Paris Convention of 1910 onwards. Eighteen countries were represented at that gathering, at which proposals for framing a convention to regulate international air traffic first took definite shape. No further progress was made until the Paris Peace Conference of 1919 set up an Aeronautical Commission, which started by laying down certain general principles on which their subsequent work was based, and the resulting convention, signed at Paris on October 13th, 1919, by the delegates of 26 governments, formed the basis of international air law.

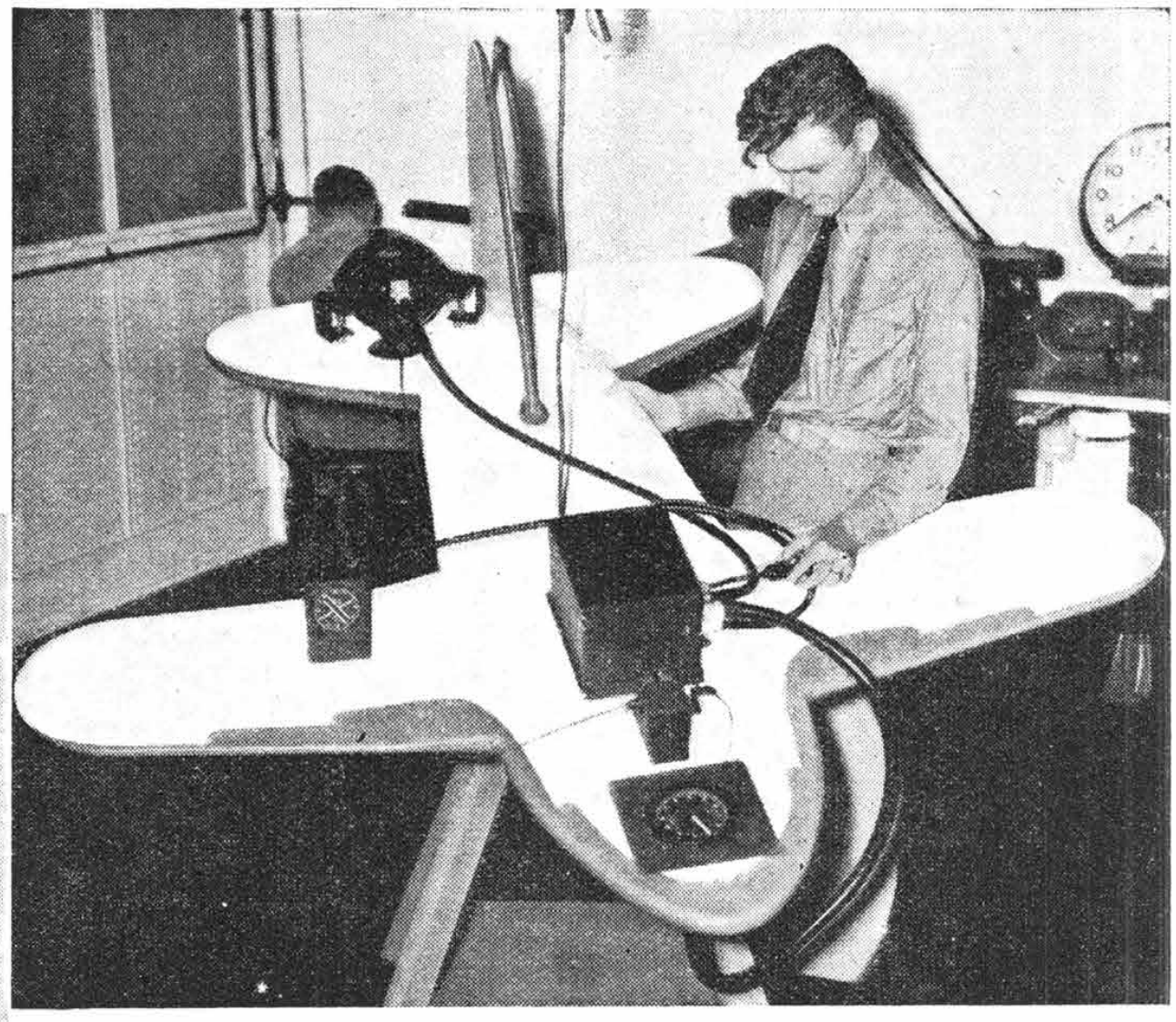
The book covers fairly comprehensively the subsequent conferences and conventions, their revisions and difficulties, and the various bodies set up to control the many facets of international air travel. Some useful statistics are also given showing the growth of the world's air services. The author draws certain conclusions and expresses opinions for which he accepts personal responsibility, but few will disagree with his contention that the dissociation of civil from military air policy is essential.

Handbook of English, by C. P. Rawson, M.Sc., and S. G. Saunders, L.R.A.M. George Allen and Unwin, 2s. 6d.

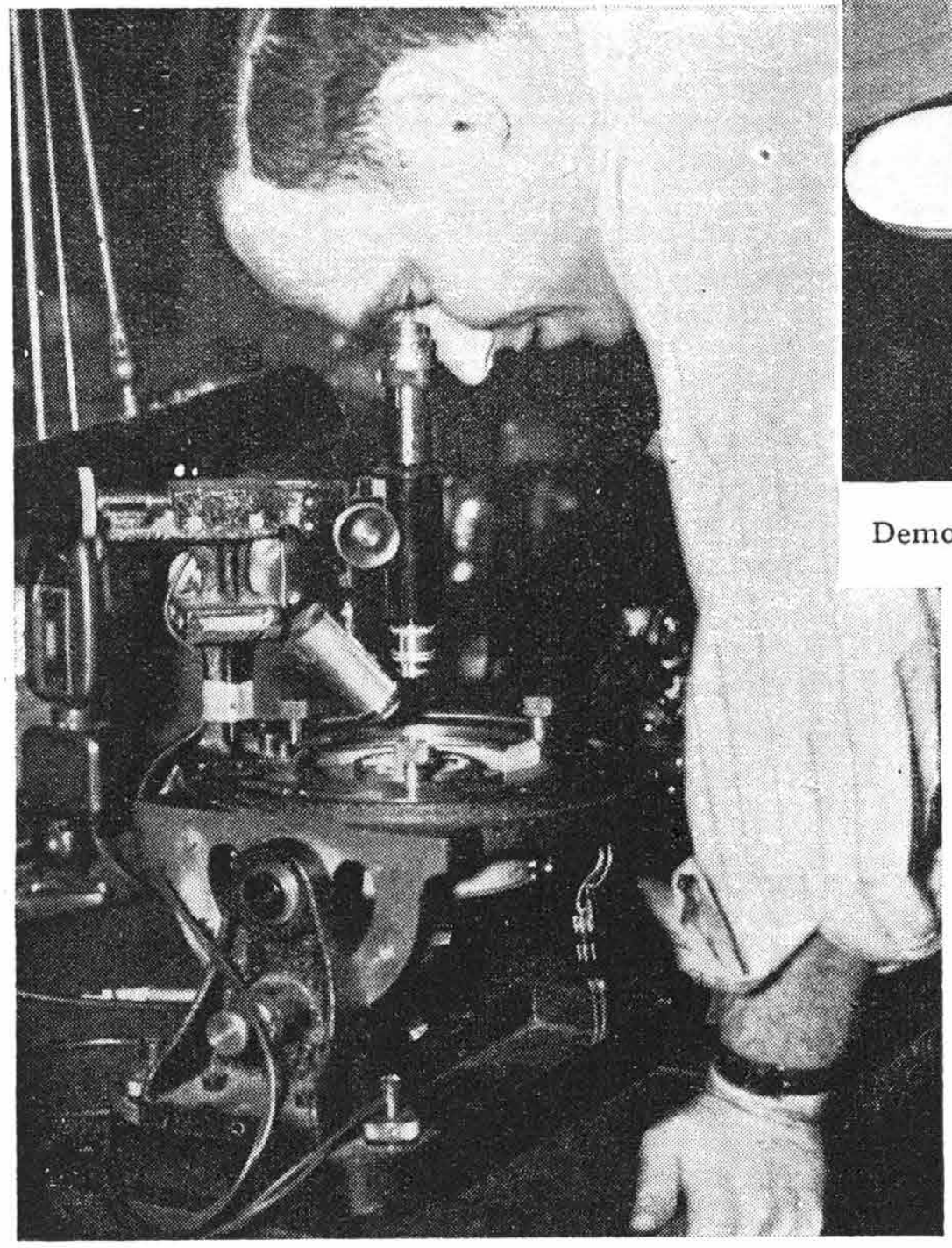
VERILY the A.T.C. cadet lacks nothing in printed works to further his education, for the publications designed especially for his edification are legion and continue to pour forth, paper shortage or no!

This one is another addition to the "Air Cadets' Handbook" series, and the course of instruction it provides has been carefully planned to meet the latest requirements and can be adapted to the demands of all pre-training schemes. Test papers form an important feature, since they will not only help with revision but constitute very good training for the coming ordeal of the examination room. Incidentally, any young cadet who is inclined to question the need for improving his English (apart from the high standard of general education rightly set by the A.T.C.) should remember that the ability to understand, and give, instructions and orders clearly can be vitally important; a misunderstood message can even result in disaster.

Gyro Flux-gate Compass



Demonstrating the steadiness of the gyro flux-gate compass on a model which can be "manœuvred" in all directions.



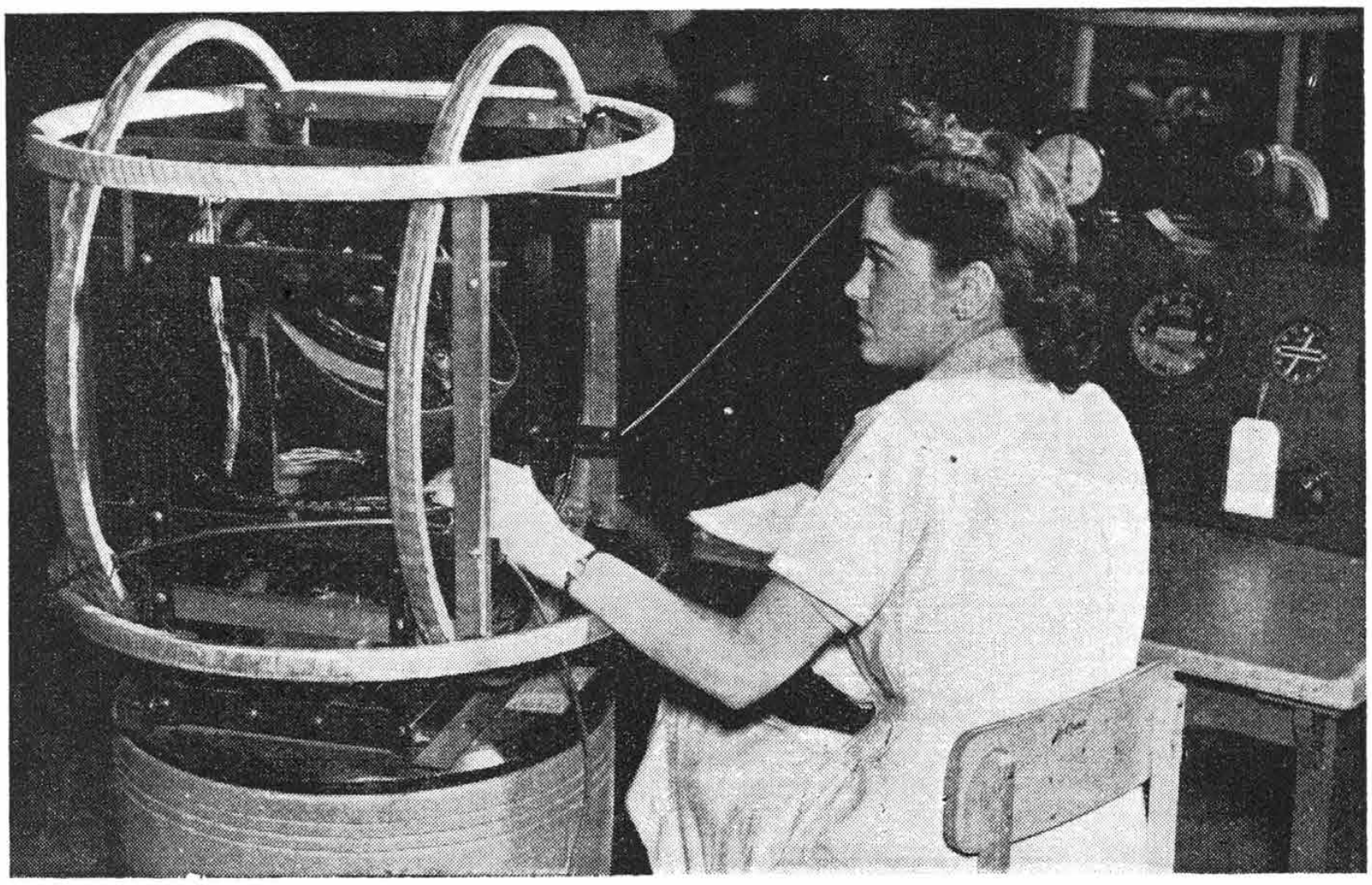
The gyroscope used for stabilising the compass horizontally is accurately balanced with the aid of a microscope.

Magnetic Compass Utilises a New Principle

EXISTENCE of a new type of compass which has been in use by the U.S.A. Air Forces for some time was revealed recently only because one or more of the instruments had fallen into Nazi hands, but it would not be possible for the enemy to produce and put into volume production during this war a copy that would duplicate the performance of the American device.

Perfection of this new compass in the course of seven years of development by engineers of the Eclipse-Pioneer Division, Bendix Aviation Corporation, and named the Pioneer Gyro Flux-Gate Compass, is said to have met the need for quick-acting, undisturbed azimuth indication in flight, to make the use of a magnetic-compass correction card unnecessary, and to avoid the errors due to precession of the gyro compass. It will have many uses after the war.

It combines the north-seeking principle of the magnetic compass with the stabilising principle of the gyroscope, and, according to W. A. Reichel, engineering director for Eclipse-Pioneer, it will not go off its reading when the aircraft dives or climbs rapidly, lag or overshoot during a turn, nor oscillate or "hunt" back and forth in rough weather. This, he said, is particularly noticeable in the polar regions, where magnetic compasses "go haywire." True significance of the development, which represents a long, forward step toward mastery of the air lanes, will not be generally realised until the



Making final tests for accuracy of the flux-gate compass.

FLIGHT
Jan. 6th
1944.
Advt. 26

GYRO FLUX-GATE COMPASS

compass is used widely on commercial aircraft and surface ships after the war.

The gyroscope is used solely to maintain positive horizontal position of a fixed coil system in which flux of the earth's magnetic field combines with actuating currents to give a north magnetic pole indication. The coil system takes the place of the sluggish, swinging and erratic magnetic-compass needle, and its combination with the gyro stabiliser is a relatively simple requirement which can be accomplished within the space and weight limitations of aircraft.

The instrument can be located at a place in the machine where it will not be affected magnetically by metal masses, such as engines, bomb load or electrical field, and its own current can be transmitted to as many remote-compass dials as are needed for pilot, co-pilot, navigator and bomb-aimer. These additional indicators are linked to the master compass through the medium of the Pioneer "magnesyn" system, which makes possible readings of indications or measurements received from a remote source. This "magnesyn" system is an advance in simplicity and lightness over the "autosyn" developed by the Bendix Marine Division for use in transmitting navigational data aboard surface ships and later adapted to aircraft.

The first showing of the Gyro Flux-Gate Compass took place at the Philadelphia Division of the corporation, where the instruments are in production for the U.S. Army and Navy. The flux gate is a coil of triangular shape, secured to the bottom of a gyroscope which spins at 10,500 r.p.m. The gate and gyro are enclosed in a pear-shaped metal housing from which electric lines lead the energy through amplifiers and thence to indicators.

One of the instruments was demonstrated on a mock-up model of an aircraft mounted on a universal joint and tipped and turned in all directions to show how the compass remained horizontal and the pointer maintained its direction without fluttering. In case of a loop, inverted flying, and violent banking, the pilot avoids possible damage of the gyroscope by "caging," or locking, it so that the axes are fixed and the device turns with the aircraft. On emerging from combat or the fighting zone, the pilot unlocks the instrument and the gyro resumes its free action.

SIR HENRY WHITE-SMITH

THE death was announced on December 28th of Sir Henry White-Smith, C.B.E. Sir Henry was not often seen in aviation circles during recent years, but in the early days of flying he was a familiar figure.

A nephew of the late Sir George White, Bart., and brother of Mr. W. G. Verdon Smith, Sir Henry did much useful work for the Bristol Aeroplane Co. in the pioneer days and afterwards. He was one of the founders of the Society of British Aircraft Constructors, whose chairman he was for a period. At the Paris Peace Conference after the first world war he represented the British aircraft industry on the International Air Convention and was awarded the distinction of Chevalier of the Legion of Honour.

After the war he became a member of Lord Weir's Advisory Committee on Civil Aviation. He continued to take a keen interest in transport, particularly air transport, was a member of the Civil Air Transport Committee, and a vice-president of the Federation of British Industries and of the Institute of Transport.

Sir Henry White-Smith retired from business some years ago and devoted himself to agriculture in Sussex.

MODERN MANNER MANNA

Bread arriving by Dakota at a South-west Pacific air base and being unloaded by native "boongs."

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

ROCKET RESEARCH

Ejectors Must be Employed

IT may interest "Dim Type" for me to tell him that many of the statements in the article on reaction or ejector propulsion sent in by Private Smith are only valid if the basic assumptions we made are accepted.

Our belief was that reaction propulsion was *utterly useless* to propel any imaginable kind of aircraft that could be useful unless ejectors were used.

If such a limitation (i.e., aircraft made for speeds of under 1,000ft. per second) is accepted, we can treat gas speeds as unimportant so long as the ejectors work properly. Before now, good articles have been made in spite of mistakes in the theory of their design.

J. DENNIS.

(One of J. J. Smith's team mates.)

PITCH PANIC

Airscrews or 100 Octane ?

THE article entitled "Pitch Panic" in your issue of December 9th was extremely interesting. Especially significant and even startling was the statement attributed to a senior officer of Fighter Command to the effect that, but for the conversion in the nick of time of the thousand or so Spitfires and Hurricanes from De Havilland two-pitch to constant-speed airscrews, the 4 to 1 ratio of enemy and R.A.F. losses in the Battle of Britain might have been reversed, with the almost inevitable inference that the result of the battle would also have been reversed.

While "So much is owed by so many to so few," the nation also owes a debt, admittedly of a lesser and very different nature, but still important, to those relatively few pioneers who imagined, sponsored, and saw through, often in the face of much opposition, the various innovations, modifications, and other developments which have ensured the continual technical superiority of the fighting equipment of the R.A.F. over that of the enemy. In this respect I think the R.A.F. have displayed a measure of relative supremacy which definitely surpasses the two other Services.

I do not believe that it is generally recognised how much this superiority would have been affected had not the decision been taken to base aircraft engine design on the use of 100-octane fuel instead of the pre-war standard grade of 87-octane rating. In fact, it was only a few months before the Battle of Britain that all fighters were changed over from 87- to 100-octane fuel, a change which enabled the Rolls-Royce Merlin engine of that period to be operated at an increased supercharger pressure which immediately gave an extra 200 h.p. or more. Subsequent engine developments made possible by the use of 100-octane instead of 87-octane fuel have since permitted a truly phenomenal increase in the power of the original engine without any change in its basic size or capacity.

It is very interesting to refer back to the records of serious discussions which took place only a year or two before the war when certain authorities expressed the very gravest misgivings at the proposal to design engines to require a "theoretical type of fuel" (i.e., 100 octane), which they feared would not be available in adequate quantity in time of war, since we were mainly dependent on America for its supply. Fortunately for Britain, the majority of those directly concerned took a different view, and I might quote a rather prophetic statement made by an Air Ministry official at a Royal Aeronautical Society meeting in February, 1937, who, in referring to the advent of 100 octane, said: "Let there be no doubt, however, that petroleum technologists and fuel research workers now have the opportunity to provide by their efforts an advance in aircraft engine development, with its effect on air power, which the engine designer by himself cannot hope to offer by any other means."

May I conclude by also quoting a reply reported to have been made recently in the U.S.A. by Mr. Geoffrey Lloyd, M.P., Joint Parliamentary Secretary to the Ministry of Fuel and Power, in answer to the question: "Do you think 100 octane was the deciding factor in the Battle of Britain in 1940?" To which Mr. Lloyd replied: "I think we would not have won the Battle of Britain without 100-octane—but we DID have the 100 octane."

Nevertheless, let us not forget that between the fuel and the airscrew there are also many other links in the chain, any one of which, had it failed, could have vitally affected the issue, while all the technical superiority in the world would, of course, have been of no avail at all without the efficient training, skill, and courage in combat of the Battle of Britain pilots.

"AERO."

THE CASE FOR THE FLYING BOAT

Mooring Alongside Ships

WITH reference to the interesting article recently published in *Flight* on the subject of the future of the seaplane or flying boat in post-war air transport developments, might I mention the following point?

It seems clear that it will be a very great advantage for these large marine aircraft to be able, when required, to moor or tie-up alongside ships moored in sheltered waters or even in the open sea.

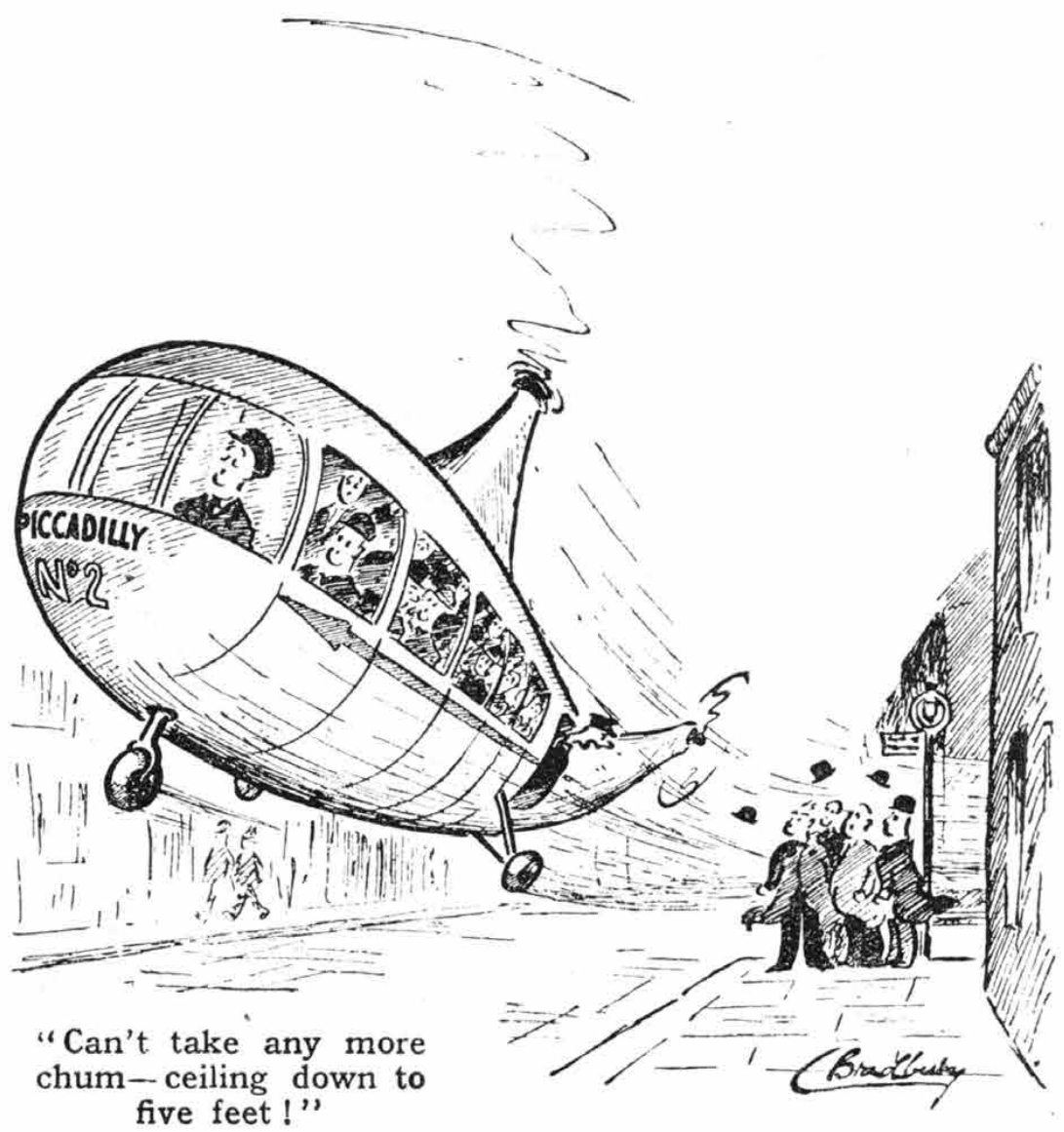
This mooring facility would allow the rapid transfer of freight, crew, and fuel from ship to aircraft and vice versa. It would also greatly facilitate repairs to the motors of the aircraft, as such work could be carried out very conveniently and rapidly with the use of the ship's derricks for hoisting heavy parts.

Mooring might have to be done with the nose of the aircraft at right angles to the length of the ship, or in strong currents with the aircraft's nose to the stern of the ship. It might even be convenient, at times, to moor the aircraft with one wing tip alongside the beam of the ship.

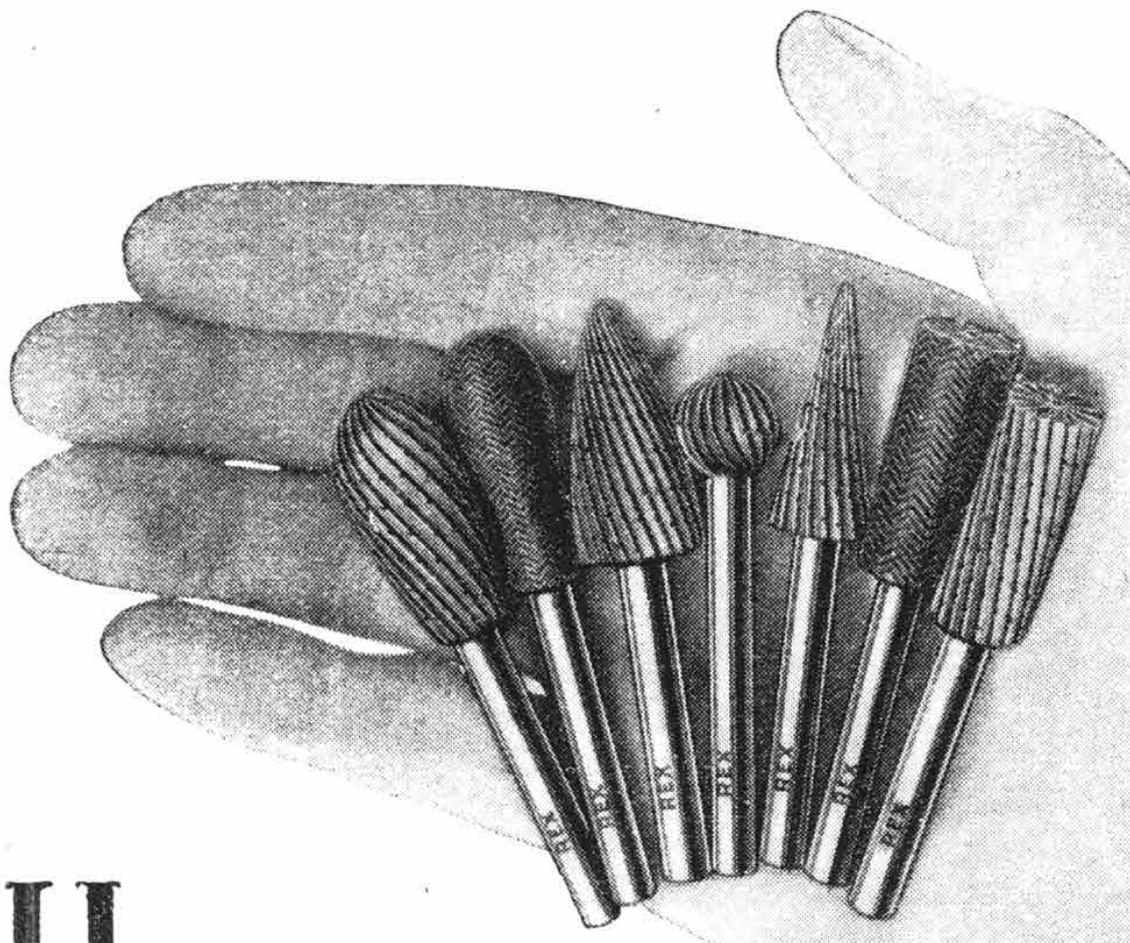
As to the method of carrying out such a system of mooring, it is clear that some effective means of fending-off must form part of the arrangement, so as to prevent injury to the relatively frail structure of the aircraft in case of a heavy swell. It is suggested that an adaptation of the old torpedo net, with its spars and other gear, would make a very simple form of fender which could be rigged at any suitable point round the ship's hull. It might be necessary to provide suitable bearing plates on the nose and wing tips of the aircraft to protect these from wear due to friction.

Perhaps some of your readers with experience of torpedo-net equipment might like to express an opinion on this suggestion?

W. ADAM WOODWARD.



"Can't take any more chum—ceiling down to five feet!"



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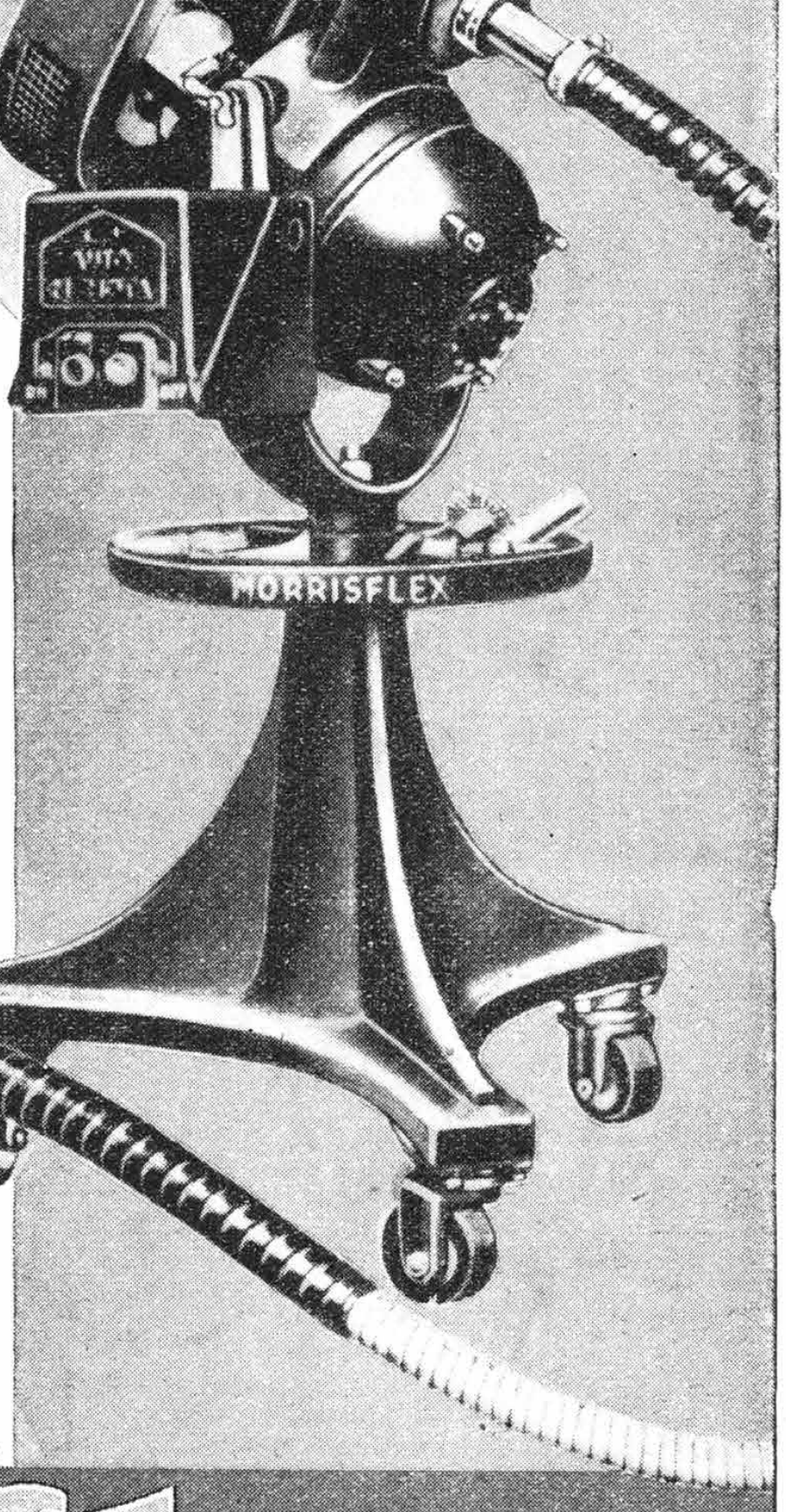
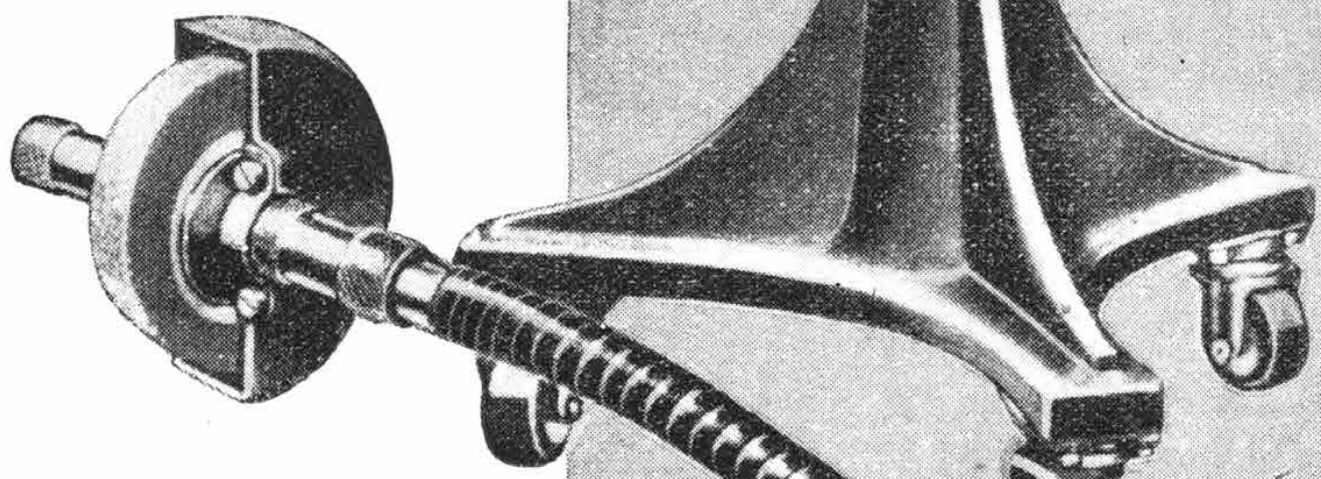
On Air Ministry, Admiralty and War Office Lists.





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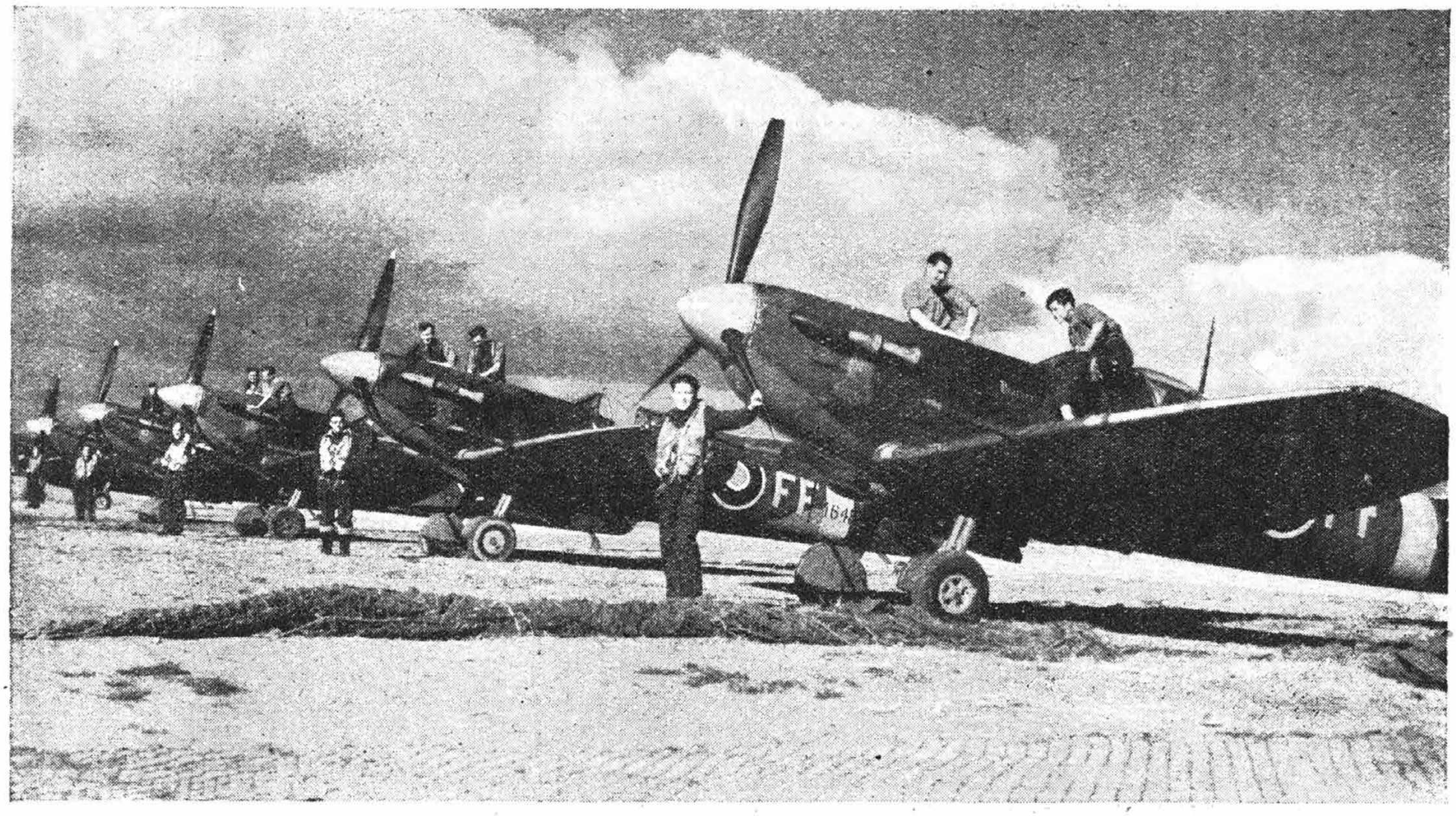


Men and machines of the Bombay squadron all set for tactical sorties over occupied territory.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Promotion

GENERAL DUTIES BRANCH.

Air Comdre. (temp.) F. J. FOGARTY, D.F.C., A.F.C., is granted the rank of Group Capt. (war subs.), December 1st, 1943.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Distinguished Service Order

Act. Sqn. Ldr. K. HUMBY, D.F.C., R.A.F.V.R., No. 199 Sqn.—Sqn. Ldr. Humby has undertaken a very large number of sorties, involving attacks on a variety of targets, including Berlin, Hamburg, Cologne and Turin. Throughout his tour Sqn. Ldr. Humby has displayed great skill and determination, and his cool judgment in the face of opposition has inspired great confidence in his crew.

Act. Sqn. Ldr. E. E. RODLEY, D F.C., R.A.F.V.R., No. 97 Sqn.—Sqn. Ldr. Rodley has displayed great courage, skill and resource throughout his tour of operations He has completed a very large number of sorties, involving attacks on industrial centres in the Ruhr and many other important targets. He has displayed outstanding devotion to duty and his example has inspired all.

Act. Sqn. Ldr. J. H. J. SAUVAGE, D.F.C., R.A.F., No. 97 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Sauvage has participated in numerous sorties, including three attacks on Berlin. He is highly skilled and a determined pilot, whose gallant efforts have contributed materially to the successes obtained.

Act. Sqn. Ldr. G. DE G. SELLS, D.F.C., R.A.F.V.R., No. 83 Sqn.—Sqn. Ldr. Sells has participated in a very large number of sorties, involving attacks on targets in the Ruhr and many other important centres. He is an outstanding leader, whose achievements have been highly commendable.

Act. Sqn. Ldr. A. B. SMITH, D.F.C., R.A.F.V.R., No. 83 Sqn.—This officer has completed a very large number of sorties, many of which have been against important and well-defended targets. He has invariably pressed home his attacks with great determination and not once has he failed to complete a sortie. His efforts have been attended with much success, and his example of skill, courage and devotion to duty has been beyond praise.

Act. Sqn. Ldr. C. A. J. SMITH, D.F.C., R.A.F.V.R., No. 83 Sqn.—Sqn. Ldr. Smith has participated in a very large number of sorties, including three attacks on Berlin. Not once has he failed to reach his target, and his attacks have invariably been pressed home with great determination. This officer has displayed outstanding skill, courage and devotion to duty, qualities which have impressed all.

Act. Sqn. Ldr. D. H. THOMAS, D.F.M., R.A.F., No. 156 Sqn.—Sqn. Ldr. Thomas has displayed exceptional skill, which has contributed materially to the success of many sorties in which he has participated. He has displayed great keenness and has proved himself to be a valuable asset. In addition to his operational activities, Sqn. Ldr. Thomas has devoted much of his knowledge and energies towards the training of other aircrews with excellent results.

Sqn. Ldr. E. C. Badcoe, No. 77 Squadron, who has been awarded a Bar to his D.F.C.

Flt. Lt. J. R. PREEDY, R.A.F.V.R., No. 101 Sqn.—This officer has completed a very large number of sorties, many of them in the Middle East. He is a navigator of high merit, and his skilful efforts have played a good part in the successful bombing of a wide variety of targets. Flt. Lt. Preedy is an ideal captain, whose fearlessness and unswerving devotion to duty have set an example of a high order.

Act. Flt. Lt. C. W. B. KELLY, D.F.C., R.N.Z.A.F., No. 156 Sqn.—Since being awarded the D.F.C., this officer has completed a large number of sorties, involving attacks on such targets as Berlin, Hamburg, Milan and important centres in the Ruhr. He is an exceptionally skilful navigator, whose efforts throughout have been featured by great persistence and determination to achieve success.

Act. Flt. Lt. W. RAYBOULD, D.F.M., R.A.F.V.R., No. 105 Sqn.—This officer has completed a very large number of sorties, and his efforts have been attended with much sucess. He is an outstanding captain, whose gallant example, dogged determination and unfailing devotion to duty have set an example of the highest order. Flt. Lt. Raybould has participated in attacks on a wide variety of targets, including attacks on Essen, Hamburg, Dortmund and Cologne.

Act. Flt. Lt. G. H. WILSON, D.F.C., R.A.F.V.R., No. 83 Sqn.—Flt. Lt. Wilson has participated in a very large number of sorties over Germany and German-occupied territory. He is a highly efficient officer, whose accurate and skilful work has contributed in large measure to the successes achieved. Flt. Lt. Wilson has rendered most valuable service.

Act. Flt. Lt. J. L. WRIGHT, D.F.C., R.N.Z.A.F., No. 156 Sqn.—This officer is an outstanding captain, who has proved his skill in very many attacks on important enemy targets. Throughout his tour he has displayed great keenness, and his determination to press home his attacks has always been evident. Flt. Lt. Wright is an inspiring leader, whose courageous example has won great praise.

Act. Flt. Lt. K. H. F. LETFORD, D.F.C., R.A.F.V.R., No. 207 Sqn.—One night in October, 1943, this officer was captain and pilot of an aircraft detailed to attack Leipzig. During the sortie the bomber was engaged by a fighter and was hit by a hail of bullets. The mid-upper gunner was wounded and his gun turret rendered useless; the wireless operator was also wounded and some of his wireless equipment was destroyed. The inter-communication gear was put out of action and other damage was sustained. The situation became alarming when some incendiary bombs and the accumulators caught fire. Nevertheless, Flt. Lt. Letford coolly organised his crew

to fight the flames, and under his able directions they succeeded in quelling the fire. When base was reached, Flt. Lt. Letford effected a perfect landing without the aid of flaps.

Bar to Distinguished Flying Cross

Capt. D. McPHERSON, D.F.C., S.A.A.F., No. 24 (S.A.A.F.) Sqn.—Capt. McPherson, who is now on his second tour of operational duty, is the leading observer in his present unit. Since the award of the D.F.C. he has completed a large number of sorties against the enemy. Many of these have been daylight operations, during which his navigational and bomb-aiming skill, together with outstanding determination, courage and devotion to duty, have rightly earned for him the reputation of being an exceptionally fine observer.

Sqn. Ldr. H. G. HOLMES, D.F.C., R.A.F., No. 500 Sqn.—This officer has recently completed his second tour of operational duty. Since the award of the D.F.C. he has completed various attacks on enemy submarines, and has continually evinced the utmost determination in pressing home his attacks.

Act. Sqn. Ldr. E. F. J. ODOIRE, D.F.C., A.F.C., R.A.F., No. 142 Sqn.—This officer has served with his present squadron since May, 1943, and has proved an excellent captain, flight commander and operational pilot. All his operations have been completed with the utmost determination and skill irrespective of enemy opposition.

Flt. Lt. J. S. MORTON, D.F.C., A.A.F., No. 219 Sqn.—Since the award of the D.F.C. this officer has been employed as pilot on both day and night fighters. He has altogether destroyed twelve enemy aircraft. Despite the hazards which he has had to face, this officer has always displayed sterling qualities.

F/O. R. J. GILLIES, D.F.C., R.A.F.V.R., No. 600 Sqn.—Since the award of the D.F.C. F/O. Gillies has participated in the destruction of five enemy aircraft. In July, 1943, during a heavy raid on Augusta and Syracuse, he skilfully directed his captain to attack six enemy aircraft, four of which were approached unobserved and shot down. One of the remaining two was damaged. That F/O. Gillies, in co-operation with his pilot, was able to accomplish this feat in bright moonlight reflects very highly on his skill and ability.

Distinguished Flying Cross

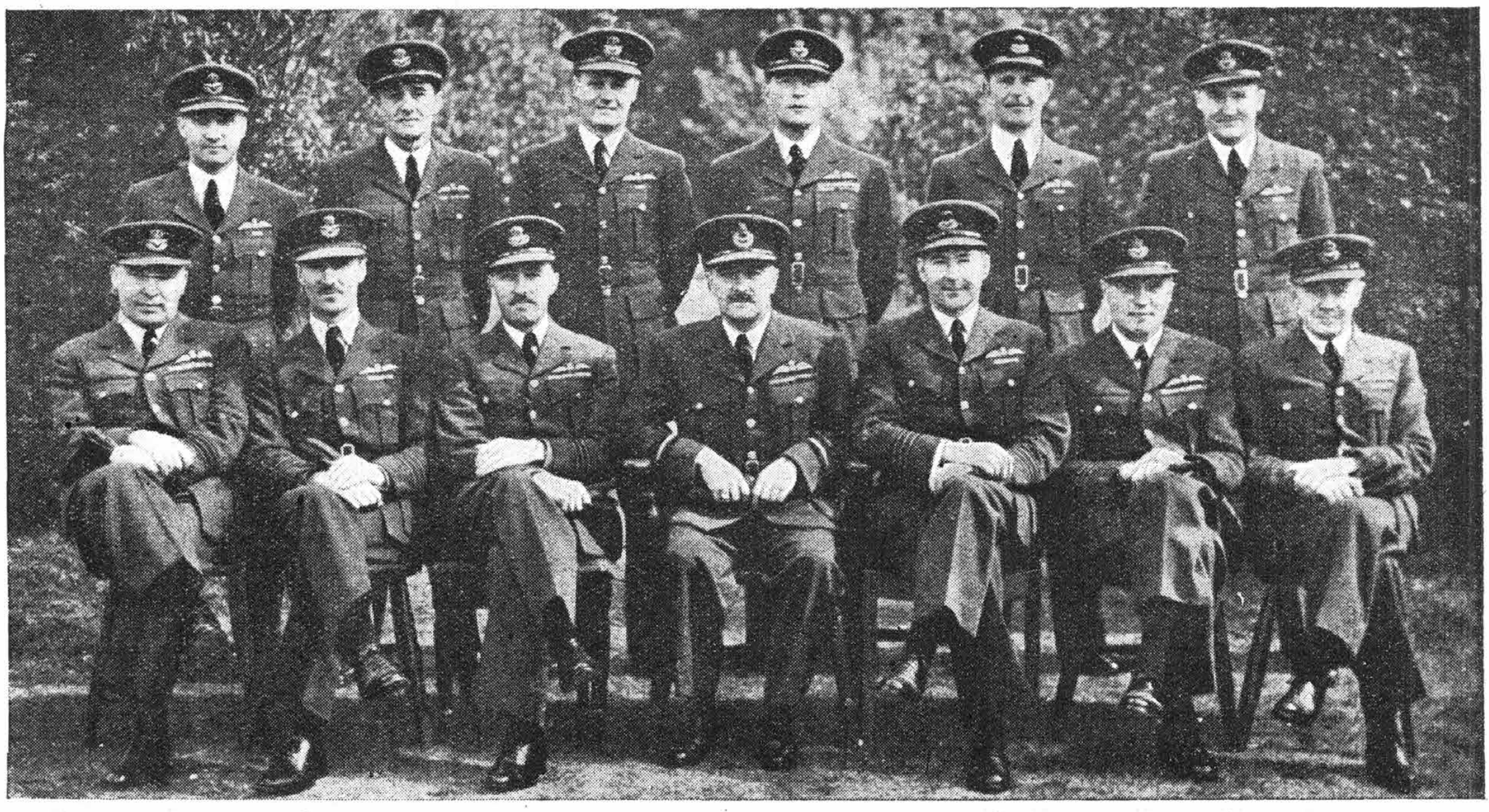
Flt. Lt. I. F. McDERMOTT, R.A.F.O., No. 104 Sqn.
F/O. J. T. BOUNDY, R.A.F.V.R., No. 225 Sqn.
P/O. J. A. V. DENTON, R.A.F.V.R., No. 158 Sqn.
P/O. W. H. F. G. HAGON, R.A.F.V.R., No. 77 Sqn.
P/O. D. NICHOLLS, R.A.F.V.R., No. 158 Sqn.
P/O. J. J. O'HANDLEY, R.C.A.F., No. 158 Sqn.
P/O. D. A. WEATHERILL, R.A.F.V.R., No. 158 Sqn.
W/O. J. T. DARBY, R.A.F.V.R., No. 115 Sqn.
W/O. A. W. SIMPSON, R.A.F., No. 158 Sqn.
W/O. E. H. BOUTILIER, R.C.A.F., No. 115 Sqn.
Wing Cdr. K. J. RAMPLING, R.A.F., No. 7 Sqn.
Flt. Lt. D. P. PATON, R.A.F.V.R., No. 600 Sqn.

SERVICE AVIATION

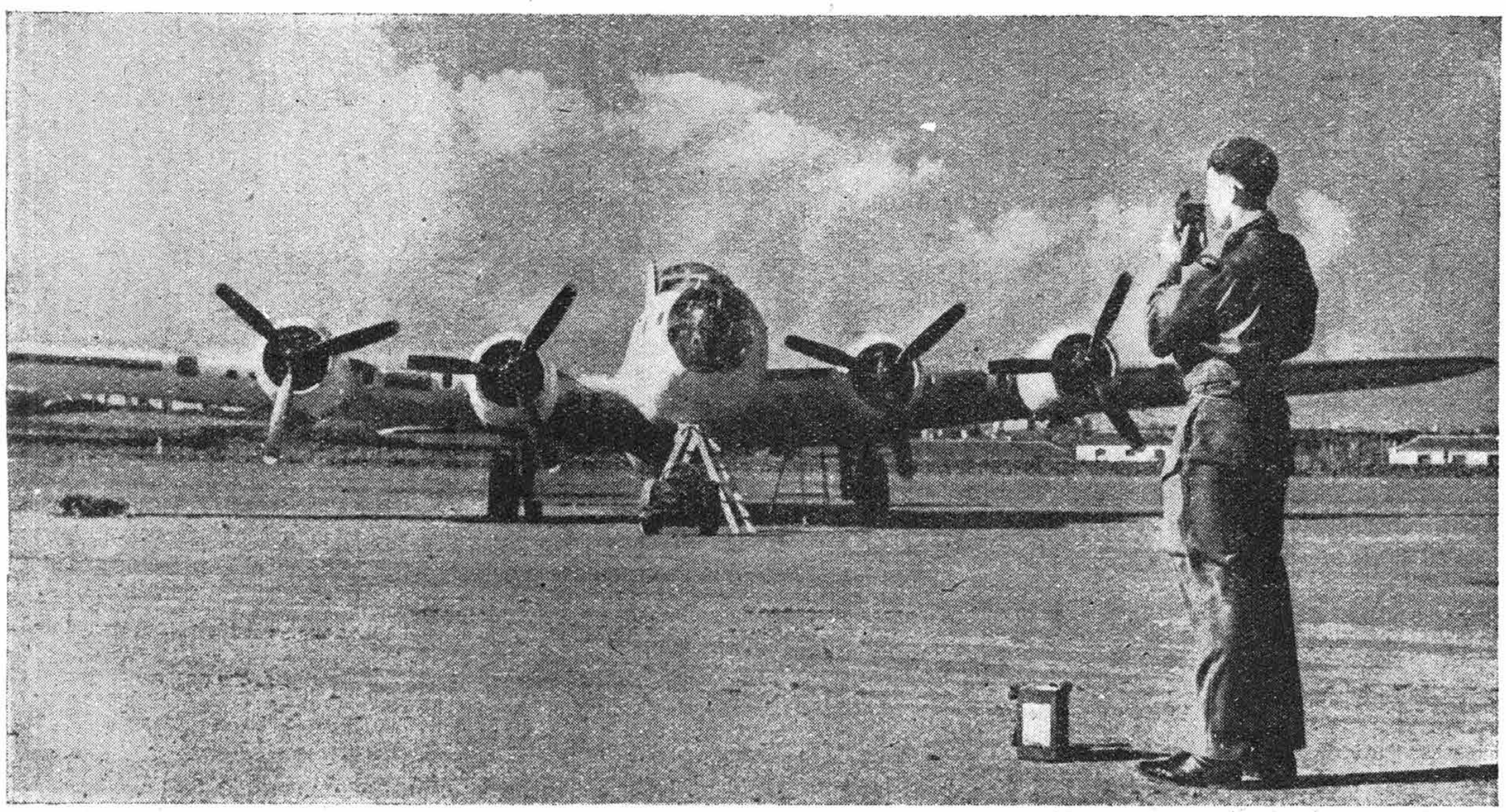
F/O. P. S. NEWHOUSE, R.A.F.V.R., No. 600 Sqn.
F/O. G. TATE, R.A.F.V.R., No. 600 Sqn.
F/O. G. J. SOUTH, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
P/O. J. R. C. HOBOKEN, R.A.F.V.R., No. 106 Sqn.
Flt. Lt. J. H. C. CLARK, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Act. Flt. Lt. E. R. GREENACRE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
F/O. D. V. APPLETON, R.A.F.V.R., No. 623 Sqn.
F/O. A. W. GADD, R.A.F.V.R., No. 101 Sqn.
P/O. E. B. DUNGEY, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
W/O. R. O. LUMGAIR, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
W/O. J. W. RITCHIE, R.C.A.F., No. 467 (R.A.A.F.) Sqn.
Lt. Col. O. F. WELLINGTON, S.A.A.F., No. 12 (S.A.A.F.) Sqn.
Maj. A. C. JANDRELL, S.A.A.F., No. 21 (S.A.A.F.) Sqn.
P/O. G. BASARICH, R.C.A.F., No. 114 Sqn.
W/O. T. R. WOODS, R.A.F., No. 114 Sqn.
Act Sqn. Ldr. G. F. POWELL, R.A.F.O., No. 47 Sqn.
Flt. Lt. C. BAILEY, R.A.F.V.R., No. 219 Sqn.
Flt. Lt. R. BRADWELL, R.A.F.V.R., No. 108 Sqn.
Flt. Lt. G. E. F. GOODE, R.A.F.V.R.
F/O. W. C. HENDERSON, R.A.F.V.R., No. 108 Sqn.
Flt. Lt. G. HUNTER, R.A.F.V.R., No. 142 Sqn.
Flt. Lt. D. C. WILSON, R.C.A.F., No. 425 (R.C.A.F.) Sqn.
Act. Flt. Lt. R. G. BELL, R.C.A.F., No. 221 Sqn.
Act. Flt. Lt. W. H. EARL, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. R. N. GOURLIE, R.A.F.V.R., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. B. K. HOWARTH, R.A A.F., No. 142 Sqn.
Act. Flt. Lt. H. A. LANGTON, R.A.F.V.R., No. 104 Sqn.
Act. Flt. Lt. G. B. LEDDY, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
Act. Flt. Lt. O. A PHILLIPS, R.A.A.F.
Act. Flt. Lt. D. RAMSEY, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. K. STAUNTON, R.A.A.F., No. 420 (R.C.A.F.) Sqn
F/O. V. D. ARDIS, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
F/O. H. L BEVAN, R.A.F.V.R., No. 150 Sqn.
F/O. A. G. FLETCHER, R.A.A.F., No. 142 Sqn.
F/O. A. F. LANCASTER, R.A.F.V.R., No 150 Sqn.
F/O. J. W. LAURO, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O J. F. LENIHAN, R.C.A.F. No. 420 (R.C.A.F.) Sqn.
F/O. J. B. D. LORT, R.A.F.V.R., No. 270 Sqn.
F/O. W. K. McGREGOR, R.C.A.F., No. 424 (R.C.A.F.) Sqn.
F/O. T. C. McNAMARA, R.A.F.V.R., No. 70 Sqn.
F/O. J. L. G. TASCHEREAU, R.C.A.F., No. 425 (R.C.A.F.) Sqn
F/O. C. A. WATT, R.A.A.F., No. 150 Sqn.
P/O. F. C. DERRY, R.C.A.F., No. 40 Sqn.
P/O. J. K. EASSON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. J. A. L. JOHNSON, R.C.A.F., No. 108 Sqn.
P/O. R. E. MACKENZIE, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
P/O. A. B. MORABITO, R.C.A.F., No. 283 Sqn.
P/O. S. J NICOLLE, R.A.F.V.R., No. 424 (R.C.A.F.) Sqn
P/O.. W. H. PILET, R.N.Z.A.F., No. 142 Sqn.
W/O. J. BURT, R.A.F., No. 37. Sqn.
W/O. D. HUMPHRIES, R.A.F., No. 142 Sqn.
Flt. Lt. R. BROADBENT, R.A.F.V.R., No. 267 Sqn.
Flt. Lt. B. SMITH, R.A.F., No. 216 Sqn.
Act. Flt. Lt. A. F. GOBBIE, R.A.F.V.R., No. 57 Sqn.
F/O. F. A. RANDALL, R.A.A.F., No. 460 (R.A.A.F.) Sqn
F/O. R. M. WHITBURN, R.A.A.F., No. 117 Sqn.
P/O. K. H. RYRIE, R.A.F.V.R., No. 57 Sqn.
P/O. S. G. STEVENS, R.A.F V.R., No. 57 Sqn.
W/O. M. G. POTTER, R A.F., No. 117 Sqn.
Sqn. Ldr. J. R. H. LEWIS, R.A.F.O., No. 227 Sqn.
Act. Flt. Lt. E. GITTINS, R.A.F.V.R., No. 227 Sqn.
Act. Flt. Lt. D. G. HARCOURT, R.A.F.V.R., No. 294 Sqn.
Act. Flt. Lt. J. A. HAYLOCK, R.A.A.F., No. 148 Sqn.
F/O. R. S. MODERA, R.A.F.V.R., No. 227 Sqn.
Lt. R. P. BURL, S.A.A.F., No 7 (S.A.A.F.) Sqn.
W/O. E. J. LEDWIDGE, R.A.F.V.R., No. 46 Sqn.
Sqn. Ldr. C. P. BARBER, R.A.F., No. 70 Sqn.
F/O. K. R. AMES, R.A.F.V.R., No. 61 Sqn.
F/O. N. D. COX, R.A.F.V.R., No. 39 Sqn.
P/O. E. F. G. HADDLESEY, R.C.A.F., No. 467 (R.A.A.F.) Sqn
P/O. I. A. HIBBERT, R.A.F.V.R., No. 10 Sqn.

Conspicuous Gallantry Medal

Sgt. A. H. COWHAM, R.A.F.V.R., No. 57 Sqn.—One night in October, 1943, this airman was the rear gunner of an aircraft detailed to attack Hanover. Shortly after the target had been bombed the aircraft was engaged by a fighter and hit by a hail of bullets which caused much damage. Sgt. Cowham was struck in the face and suffered a severe iniury to one of his eyes. Although his turret was virtually wrecked he fought on with great resolution and played a good part in driving off the attacker. Throughout the long journey home this brave gunner, although in intense pain and suffering from the loss of blood, refused to leave his post. Twice, subsequently, his accurate shooting prevented an enemy aircraft from closing in, while his skilful directions assisted his pilot to out-manœuvre the enemy and fly clear. In harassing circumstances his gallant example greatly encouraged his comrades who were striving to bring the crippled bomber home. On this, his first sortie, Sgt. Cowham displayed courage, fortitude and devotion to duty in keeping with the best traditions of the Royal Air Force.



Station Commanders of a Group in R.A.F. Flying Training Command. Left to right (standing) : Wing Cdr. W. E. Hooper, A.F.C., Wing Cdr. S. M. Goldsmith, Wing Cdr. A. D. Bennett, A.F.C., Wing Cdr. G. C. O'Donnell, D.F.C., A.F.C., Wing Cdr. E. Goldsmith, A.F.C., Wing Cdr. R. P. Garnons Williams, A.F.C. Sitting : Wing Cdr. I. W. C. Mackenzie, A.F.C., Wing Cdr. J. F. Moir, A.F.C., Wing Cdr. H. F. Jenkins, A.F.C., Air Comdre. H. G. Bowen, M.B.E. (Group Commander), Wing Cdr. G. E. F. Arthur, A.F.C., Wing Cdr. C. A. Pike, A.F.C., Wing Cdr. T. W. Campbell, A.F.C.



Using the hand bearing compass to swing the main compass of a Coastal Command Fortress on one of the new air bases in the Azores.

SERVICE AVIATION

Flt. Sgt. F. J. STUART, R.A.F., No. 426 (R.C.A.F.) Sqn.—One night in October, 1943, this airman piloted an aircraft detailed to attack Leipzig. Before the target was reached the aircraft was intercepted by a fighter which attacked with great persistence. Much damage was sustained before Flt. Sgt. Stuart succeeded in flying clear. Shortly afterwards another fighter made a series of attacks but, with superb skill, Flt. Sgt. Stuart evaded them. His aircraft was badly crippled. The cockpits, turrets, hydraulic gear and other essential equipment were damaged. The petrol tanks had been pierced and one of the gunners wounded. Undaunted, this valiant pilot went on to bomb his target and afterwards flew the crippled bomber to base where he effected a masterly landing.

Distinguished Flying Medal

Sgt. W. E. ROGERS, R.A.F.V.R., No. 115 Sqn.
Flt. Sgt. (now P/O.) P. B. JACKSON, R.A.A.F., No. 102 Sqn.
Flt. Sgt. R. LOCKHART, R.A.F., No. 37 Sqn.
Flt. Sgt. R. THACKRAY, R.A.F.V.R., No. 10 Sqn.
Sgt. J. D. ASPIN, R.A.F.V.R., No. 625 Sqn.
Sgt. E. FURNESS, R.A.F.V.R., No. 158 Sqn.
Sgt. G. E. C. LUCAS, R.A.F.V.R., No. 106 Sqn.
Flt. Sgt. J. T. LYONS, R.A.F., No. 600 Sqn.
Sgt. L. G. RAYMOND, R.A.F.V.R., No. 158 Sqn.
Flt. Sgt. A. T. BOWLBY, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Flt. Sgt. C. M. WALLACE, R.N.Z.A.F., No. 467 (R.A.A.F.) Sqn.
Sgt. K. N. HICKLIN, R.A.F.V.R., No. 101 Sqn.
Sgt. R. STOTT, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. W. H. BUCKLEY, R.A.F.V.R., No. 425 (R.C.A.F.) Sqn.
Flt. Sgt. A. W. JAMESON, R.A.F.V.R., No. 142 Sqn.
Flt. Sgt. R. C. HAWKINS, R.A.F.V.R., No. 425 (R.C.A.F.) Sqn.
Flt. Sgt. C. HORNE, R.A.F.V.R., No. 283 Sqn.
Flt. Sgt. W. C. JACKSON, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Sgt. T. MAHER, R.A.F.V.R., No. 150 Sqn.
Flt. Sgt. (now P/O.) D. H. PARKER, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Sgt. A. J. SULLIVAN, R.A.F.V.R., No. 150 Sqn.
Flt. Sgt. W. W. TURLEY, R.A.F.V.R., No. 52 Sqn.
Sgt. A. J. JAKEMAN, R.A.F., No. 40 Sqn.
Sgt. C. H. LOCK, R.A.F.V.R., No. 142 Sqn.
Sgt. (now P/O.) L. G. SULLIVAN (R.A.A.F.), No. 150 Sqn.
Sgt. D. F. SYKES, R.A.F.V.R., No. 70 Sqn.
Sgt. H. WILKES, R.A.F.V.R., No. 150 Sqn.
Flt. Sgt. T. W. DIMMA, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Flt. Sgt. P. D. MITCHELL, No. 619 Sqn.
Flt. Sgt. L. H. GOULD, R.A.F.V.R., No. 179 Sqn.
Sgt. D. M. CORNISH, R.C.A.F., No. 179 Sqn.
Sgt. H. O. J. SPARKS, R.A.F.V.R., No. 207 Sqn.
Flt. Sgt. M. W. JACKSON, R.A.A.F., No. 46 Sqn.
Sgt. H. H. SHERER, R.A.F.V.R., No. 51 Sqn.
Sgt. J. H. JENNINGS, R.A.F.V.R., No. 10 Sqn.

The King has been graciously pleased to approve the following award:—

Military Medal

Act. Flt. Sgt. C. L. SCHOFIELD, No. 74 Sqn., R.A.F.—On October 6 this airman was detailed to man an Italian Breda gun at Simi. He remained on the site for seven days, sharing the duties with another airman. The gun was in a key position and was attacked incessantly by Stukas, but Flt. Sgt. Schofield remained at his post and fired his gun even when the flash eliminator was burnt off and the sights had fallen off owing to the heat of the gun. This airman probably destroyed one of the enemy aircraft, although he had been wounded in the arm. On the first day of the invasion of Simi some Germans were detected below the position of the gun. Flt. Sgt. Schofield participated in an attack against them and brought back one of the enemy's wounded.

Foreign Decorations

THE KING has granted unrestricted permission for the wearing of the undermentioned decorations, conferred upon the officers indicated, in recognition of valuable services rendered in connection with the war:—

Conferred by the President of the United States of America

Legion of Merit (Commander)

Wing Cdr. G. P. GIBSON, V.C., D.S.O., D.F.C., R.A.F.O.

Silver Star

Air Cmdre. A. C. H. SHARP, R.A.F.

Roll of Honour

Casualty Communiqué No. 327.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "On active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 98 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—F/O. G. W. Mosley; P/O. A. C. Watson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. Cordingley; F/O. J. W. W. Holmes; Sgt. S. Laughlin; Sgt. G. E. Lewis; Sgt. R. B. Loverseed; Sgt. A. Steel; Sgt. L. Tulloch; P/O. J. D. Wallace; F/O. V. A. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Sqn. Ldr. R. B. Bagguley; Sgt. A. R. Camburn; Sgt. C. S. Carroll; Flt. Sgt. F. W. R. Cole; Sgt. A. Cresswell; Sqn. Ldr. C. Crichton-Miller; Flt. Lt. M. E. J. Croker; Sgt. E. F. Crowhurst; F/O. P. W. Digby; Sgt. T. E. Edwards; Sgt. T. E. Ellingham; Sgt. J. H. P. Evans; F/O. L. Foulds; Sgt. E. L. Gummer; P/O. H. Harwood; Sgt. R. E. Hawkins; F/O. M. C. Hayes; Sgt. J. N. Hendry; Flt. Sgt. T. W. Holland; Sgt. J. K. Howarth; Flt. Sgt. W. P. Hudson; Sgt. T. T. Jardine; Sgt. E. Lewis; Sgt. W. Mather; Act. Wing Cdr. H. C. Mayers, D.F.C.; F/O. J. A. Mitchell; Sgt. I. E. Mobley; P/O. R. Nash; Sgt. T. Patterson; Sgt. W. C. Pitt; Sgt. H. S. P. Radford; W/O. K. R. Rees; Sgt. R. B. Smith; Sgt. T. H. Smith; Sgt. R. Stansfield; Flt. Sgt. W. Stephen; Sgt. I. M. Thomas; F/O. A. Trott; F/O. D. H. Upsher; Sgt. F. G. Williams; Sgt. G. R. Y. Wood; F/O. G. D. Wright.

WOUNDED OR INJURED IN ACTION.—Sgt. L. J. Bentley; Sgt. R. W. Rose; Sgt. F. A. Thrower.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. R. E. Dunn.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. Dawson; Sgt. A. R. Fuller; Sgt. I. Jenkins; Sgt. L. W. Longman; Sgt. A. McLaughlin; Sgt. A. W. F. Notman; Sgt. W. E. Price; Sgt. D. C. Sullivan; P/O. A. Thorp; Sgt. J. T. Zuidmulder.

MISSING.—Sgt. R. F. Allcorn; Sgt. J. F. A. Bailey; P/O. A. V. C. Barden; Sgt. T. J. Barrett; Sgt. F. W. Bate; Flt. Lt. R. Beckton; Sgt. J. P. Belfield; Sgt. T. Bell; Sgt. W. Bell; Sgt. P. Bennett; P/O. H. Besson; Sgt. J. B. E. Birrell; W/O. I. H. Blackburn; Sgt. L. T. Brawn; P/O. A. B. Broadbent; Sgt. A. B. Brunton; Sgt. W. A. Bryson; Sgt. E. G. Burnett; P/O. R. J. Clark; Sgt. R. Cornwell; Sgt. H. E. Cracknell; Sgt. T. H. Davies; Flt. Sgt. W. A. Dearman; Sgt. Y. Demeillac; Sgt. G. D. Dodson; Sgt. D. H. Douglas; Sgt. P. E. Duckers; Flt. Sgt. A. Fieldhouse; F/O. C. W. Foster; F/O. F. C. Gale; Flt. Sgt. W. F. Garrod; Act. W/O. C. C. Goff; Sgt. E. Graham; P/O. F. Grundy; Flt. Lt. E. M. C. Guest, D.F.C.; Sgt. J. Hamer; Act. Sqn. Ldr. M. J. Harris; Flt. Sgt. W. E. Hasjam; F/O. A. Hassell; Sgt. V. B. Hawkins; Sqn. Ldr. J. E. R. Hayter, D.F.C.; Sgt. J. M. Healey; F/O. J. S. Heasman; F/O. F. R. Heeley; Sgt. K. Herring; Flt. Sgt. E. Heweston; Sgt. P. Hindley; Sgt. P. F. Hornbrook; Flt. Sgt. G. J. T. Horton; Act. Sqn. Ldr. D. J. Kilgallin; Sgt. C. H. Leech; Sgt. E. K. Leeves; Sgt. F. N. MacAuley; F/O. D. McMillan; Sgt. R. J. K. Machan; Sgt. A. Miller; P/O. C. M. Murfitt; Sgt. A. J. Murtagh; Sgt. K. J. Offer; Sgt. T. Owens; P/O. A. T. Parker; P/O. L. J. Powell; Flt. Sgt. J. K. Prudhoe; Flt. Lt. J. Rintoul; Act. W/O. J. T. C. Rhodes; Flt. Sgt. H. P. Robinson; Sgt. T. P. Rowlands; Sgt. A. P. Royse; Sgt. J. G. Smith; Sgt. F. Southern; Sgt. R. W. Spencer; Sgt. T. F. Stott; Sgt. J. W. E. Sutherland; Sgt. C. E. Tarbin; Sgt. K. G. Taylor; Act. Flt. Lt. J. E. Walton; F/O. D. V. Warner; Flt. Lt. F. C. Webb, D.F.M.; Sgt. J. P. Williamson; Sgt. R. Wilson; P/O. A. E. Winn; Flt. Lt. W. G. Wood.

KILLED ON ACTIVE SERVICE.—P/O. J. A. J. Baard; Sgt. A. R. Banks; Sgt. J. S. Beech; Flt. Sgt. R. F. Best; Act. Sgt. J. P. D. Burley; F/O. N. J. Furlong; L.A/C. C. Gardiner; L.A/C. N. W. Gay; Sgt. J. Halbert; F/O. R. T. Holloway; F/O. W. D. Jarratt; Sgt. W. O. Jones; Flt. Sgt. G. Lamb; Sgt. A. Longworth; Sgt. J. K. MacLuskie; Sgt. G. W. Midwinter; L.A/C. W. D. Nethercott; Sgt. E. Pennington; Sgt. T. E. Rae; P/O. D. J. R. Ritchie; Sgt. K. G. Roberts; F/O. C. Seymour; Sgt. G. Slatter; Flt. Sgt. H. Smith, D.F.M.; Sgt. J. B. Speake; Cpl. H. A. Stevens; Sgt. A. McC. F. Taylor; Flt. Lt. R. H. P. Thomas; Sgt. R. L. Whitlock; F/O. R. J. Williams; F/O. R. A. L. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—A/C.2 W. F. Laurence.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—P/O. C. G. Salisbury.

WOUNDED OR INJURED ON ACTIVE SERVICE.—

SERVICE AVIATION

Flt. Lt. J. A. Carstairs; Flt. Sgt. F. J. Dean; L.A/C. C. Graham; Sgt. R. H. J. Hyde; Sgt. J. A. G. Thompson.

DIED ON ACTIVE SERVICE.—A/C.1 J. J. Barrett; Flt. Lt. C. F. M. Burry; L.A/C. R. C. Green; L.A/C. M. J. Light; A/C.1 T. H. E. Palmer; A/C.1 R. C. Pell; L.A/C. C. A. Wilde.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. L. S. Blanchard; Sgt. J. Grant; Act. Sqn. Ldr. P. Olver, D.F.C.; Sgt. D. T. Toohig; F/O. A. P. F. Waddington; P/O. D. R. Walter; Sgt. P. F. Wright.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—L.A/CW. L. McKie.

Royal Australian Air Force

KILLED IN ACTION.—F/O. C. H. Johnston.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. A. C. Johnston; P/O. E. S. MacKenzie; Flt. Sgt. N. R. Mason; F/O. R. W. Meaton; P/O. W. M. Wendon; Flt. Sgt. R. G. Wynn.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. J. H. T. Hayes; Sgt. W. R. Matthews; F/O. E. L. Musgrave, D.F.C.; Sgt. L. L. Rodgers; Sgt. J. C. Wade.

MISSING.—F/O. L. T. Carter; P/O. A. M. C. K. Finnie; Flt. Sgt. W. T. Guy; Flt. Sgt. L. J. Hinton; Flt. Sgt. J. W. Kealy; Flt. Sgt. D. C. Lake; P/O. L. J. Pringle; P/O. J. Turnbull; F/O. C. G. White.

KILLED ON ACTIVE SERVICE.—F/O. I. A. McAdam.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. H. Bowden; Sgt. D. O. Broughton; Sgt. L. Dubetz; Sgt. C. A. Gruchy; Sgt. O. J. Haralson; F/O. W. A. G. Hardy; Act. W/O. J. L. Lee; Sgt. L. D. McEwen; F/O. G. A. McNichol; F/O. A. E. Parsons; F/O. C. E. Porter.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. H. D. Baker; F/O. J. O. L. Desroches; F/O. A. T. Doucette, D.F.C.; Sgt. J. Gillespie; F/O. G. P. H. Ledoux; W/O. D. J. McKay; Sgt. T. D. Scarff; P/O. F. M. Tomlinson; Flt. Sgt. P. P. Trudeau.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. K. J. W. Burns.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. G. E. Dalton; P/O. J. R. Hillhouse; Sgt. R. V. B. Knox; Sgt. T. McP. Martin; P/O. T. J. Muir; Sgt. L. C. Schmidt; Sgt. F. W. Smith; Sgt. R. M. Watson.

MISSING.—Flt. Sgt. C. M. Carr; Flt. Sgt. J. T. Carrigan; Sgt. J. R. Cote; Flt. Sgt. H. D. A. Dauk; F/O. A. J. Ellis; F/O. B. G. Foley; F/O. P. F. L. Glynn; P/O. R. G. Leese; Flt. Sgt. D. W. McInnis; Sgt. D. H. McKitterick; Flt. Sgt. I. A. Martin; Flt. Sgt. F. F. Mercer; Sgt. C. J. C. Norquay; P/O. D. T. Randall; F/O. D. B. Stewart; Flt. Sgt. G. S. Taylor; Flt. Sgt. E. F. Warr.

KILLED ON ACTIVE SERVICE.—Sgt. F. P. Smith.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. E. Bemister; P/O. J. H. Borley; P/O. W. G. J. Richardson.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. D. F. I. Hardman; Sgt. C. E. LeM. Small.

MISSING.—P/O. R. J. Buckham; P/O. F. I. Calvert; P/O. K. F. Shaw.

KILLED ON ACTIVE SERVICE.—Act. Flt. Lt. R. C. Rawlings, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. H. D. R. Rayment.

South African Air Force

MISSING.—Lt. F. O. Griffin; Act. Cpl. E. Hollows; Act. Sgt. W. Hooper; Act. Cpl. O. G. Huntly; Air Mech. R. Jordaan; Air Mech. J. Levy; Lt. A. Lewin; Act. Cpl. M. T. Pitchers; Air Mech. M. J. C. Rabe; Air Mech. A. J. Rink; Act. Cpl. C. J. Schindder; Air Mech. J. F. Steenkamp; Air Mech. A. H. Terhoven; Act. Cpl. G. E. Willis.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Maj. J. E. Parsonson.

Casualty Communiqué No. 328.

Of the names in this list 99 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—P/O. K. H. Beames; Sgt. D. Bick; Act. W/O. C. J. W. Boone; Sgt. C. H. A. Clark; F/O. P. S. Cunningham; Sgt. R. Davis; Act. Sqn. Ldr. M. I. Freeman; Sgt. J. P. Nyland; Sgt. E. A. Pack; F/O. G. S. Thomas; Sgt. T. Warhurst; F/O. R. L. Watts.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. G. R. Baker; Sgt. S. J. Gray; Sgt. T. Martin; Sgt. T. G. Rait; F/O. D. J. Rose.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. Abbott; F/O. C. R. C. A. Allberry; Sgt. P. H. Alderton; F/O. P. C. Astrosky; Sgt. R. Bailey; Sgt. C. G. Banford; Sgt. W. Barrett; Sgt. R. F. Beaumont; Sgt. J. A. M. Bell; F/O. G. C. Bellman; Sgt. R. Brown; Sgt. M. G. W. Capon; Sgt. M. J. Crowley; Sgt. D. Curtis; Sgt. L. H. Curtis; Flt. Sgt. A. N. Dixon; Sgt. J. F. Fletcher; Flt. Lt. G. T. R. Francis; Sgt. J. Gallagher; Sgt. R. E. Gladwish; P/O. G. Griffiths; Sgt. R. Hargreaves; Sgt. R. A. Hall; Sgt. A. R. Harding; Sgt. C. L. James; Sgt. T. I. James; Sgt. R. J. Johnson; Sgt. G. T. Kennington; Sgt. R. J. Kernick; Sgt. R. A. J. King; Sgt. N. R. Knights; Sgt. S. Lupton; Sgt. J. McCormick; Sgt. A. F. McDonald; F/O. B. R. McNair, D.F.C.; Sgt. R. P. Marvin; Sgt. R. Moore; Flt. Sgt. H. W. Morton; Sgt. D. T. Penry; Sgt. C. Petherbridge; Flt. Lt. T. H. O. Richardson; Sgt. N. P. Richmond; Sgt. T. C. Robertson; Sgt. P. Rogers; F/O. L. R. C. Shadwell; P/O. N. C. Shattock; F/O. R. S. Tedder; Sgt. J. Thomas; Flt. Sgt. A. F. E. Tilley; Flt. Lt. S. L. Treves; Sqn. Ldr. E. F. Tyler; Sgt. W. A. Upston; Sgt. R. N. Vaisey; Sgt. T. H. Webb; Sgt. C. D. Whitehall; Sgt. G. J. Wilson; Sgt. J. Wratten; Sgt. C. H. Yoxall.

WOUNDED OR INJURED IN ACTION.—Sgt. L. W. Gray; Sgt. D. G. Robertshaw.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. P. M. Adams; Sgt. W. T. Adamson; Sgt. T. A. Ashcroft; F/O. R. E. Baker; Sgt. R. W. H. Board; Sgt. F. R. Brine; Sgt. V. R. Bucksey; Sgt. E. H. Chapman; Flt. Sgt. R. A. Collins; P/O. R. Coulson; F/O. R. V. Fisher; W/O. P. J. Hay; Sgt. L. R. Head; Sgt. M. W. Hitchin; Sgt. D. Hydes; F/O. B. E. C. MacPherson; Sgt. E. Mallin; Flt. Lt. R. W. Smith; Sgt. W. S. Smith; Sgt. T. R. Spencer; F/O. E. A. Thomas; Sgt. S. B. Watson; Sgt. K. Williams.

MISSING.—Sgt. D. A. Adams; Sgt. G. E. Aldous; Flt. Lt. J. T. Anderson; F/O. F. G. Andrews; Sgt. P. Barton; Sgt. G. H. McD. Batten; Sgt. G. Beeken; Sgt. C. J. Bettsworth; Sgt. E. R. Boreham; F/O. D. J. Boston; Sgt. E. A. Brinton; Sgt. J. H. Brown; Sgt. F. E. Bryant; F/O. S. G. Burnham-Richards; Sgt. F. G. Calway; F/O. H. E. Carrott; Sgt. P. Cassidy; Sgt. D. S. K Chappell; Sgt. R. A. Chumbley; F/O. R. C. S. Clements; Flt. Sgt. F. Cowie; Sgt. V. Crookes; P/O. G. Davies; P/O. T. H. Davies; Sgt. H. Dobson; Sgt. A. D. Dufty; Sgt. R. E. Dykes; P/O. L. Eaude; Sgt. T. R. Ewan; Sgt. H. T. Finch; Sgt. E. J. Francis; P/O. F. J. Fry; P/O. C. Fuller; Sgt. A. E. Gadsby; Sgt. E. A. Gibbs; Sgt. E. H. Gold; Sgt. G. H. Harner; Sgt. L. Harrett; P/O. P. Harstein; Sgt. C. T. Harston; P/O. J. Horne; Flt. Sgt. D. L. W. Horn; F/O. A. J. Horobin; Sqn. Ldr. D. W. S. Howroyd; W/O. P. J. Jennings; Act. W/O. F. R. Joy; Flt. Sgt. R. G. Kelly; Sgt. E. Kempsen; F/O. W. J. Lake; Sgt. H. J. Lewis; Sgt. J. S. Long; Sgt. J. M. McCormack; Sgt. F. Madden; Sgt. R. Mather; P/O. P. E. Newland; Sgt. M. J. O'Donovan; Sgt. J. O'Leary; P/O. F. E. S. Parker; F/O. P. S. Porteous; Sgt. E. H. Scraton; Sgt. S. G. Short; Sgt. M. G. Smallridge; Sgt. R. S. Sprackman; P/O. R. Stevens; Sgt. F. W. Stubbings; Sgt. R. L. Swindale; Sgt. J. E. Swindin; Sgt. R. Thompson; Sgt. F. A. Tiley; Sgt. J. P. Todd; Sgt. R. Trahair; Sgt. A. Turner; Sgt. W. Voss; F/O. S. H. Walker; Sgt. C. Wharton; Sgt. A. Williams; Flt. Sgt. H. J. Willis, D.F.M.; Sgt. G. A. Wilson; Sgt. R. A. Woodward.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. D. T. W. Cammies; Sgt. C. J. Hole; Sgt. W. J. Sadler.

KILLED ON ACTIVE SERVICE.—Sgt. E. Atkinson; Flt. Sgt. C. H. Baden; P/O. R. Blewett; Sgt. C. G. Braund; Flt. Lt. D. H. Brewer; Sgt. A. E. Carter; Sgt. E. R. Cole; Sgt. G. E. Cozens; Sgt. D. Crosland; Sgt. K. Ellis; Flt. Sgt. D. S. Evans; Sgt. A. C. Harper; Sgt. P. Jackson; P/O. H. J. H. Jones; Sgt. F. J. Luckett; Sgt. J. C. Mitchell; Sgt. J. Nelson; Sgt. W. G. Prosser; Sgt. K. B. Roberts; Sgt. W. J. Southern; Flt. Sgt. J. J. Timmins; Sgt. R. Whiting; Sgt. A. G. W. Wright.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. E. D. Markham; Sgt. C. S. Rumble; Flt. Sgt. H. W. Ward.

Left to right: No. 27 Squadron, "Quam Celerrime ad Astra" (Full speed to the stars); No. 8 Flying Training School, "More Optimo Exercemur" (Our work is first class); No. 11 Flying Training School, "Passim ad Astra" (Aerial ubiquity).

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. C. F. West.

DIED ON ACTIVE SERVICE.—L.A/C. A. R. Jacobs; Sgt. E. G. Johnson; L.A/C. J. Openshaw.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. P. W. Dunn; Act. Flt. Lt. K. H. Grenfell; F/O. S. F. S. McCullagh; Flt. Sgt. R. L. Potter.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. D. Armour; Flt. Sgt. I. G. Miller.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. R. Cramp; Flt. Lt. C. C. Mayberry.

MISSING.—Flt. Sgt. I. R. Chalmers; Flt. Sgt. W. F. Nethersole; Flt. Sgt. T. C. O'Sullivan; Flt. Sgt. J. K. Read; Sgt. C. A. Walsh.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. S. W. Murray; P/O. A. F. Smith.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. F. D. Dwyer; Flt. Sgt. W. J. Hoar; F/O. D. D. Johnston; Sgt. G. R. Smith.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. L. J. Deschamps; Sgt. T. C. Dubose; Flt. Sgt. W. J. Kinnaird; F/O. W. T. Lewis, D.F.M.; Sgt. E. A Norman; Sgt. K. E. Price; Flt. Sgt. R. H. Stewart; F/O. E. G. Thornber; Flt. Sgt. J. W. Toon.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. G. Alderson; P/O. R. O. Blackhall; Flt. Sgt. C. M. McG. Coghill; Sgt. R. O. M. Dunlop; F/O. W. J. Freeman; Sgt. S. Hanan, Sgt. W. H. Hill; Sgt. F. S. Lane; F/O. G. F. Mabee; Sgt. J. R. Martyn; Flt. Sgt. D. S. Mitchell; Flt. Sgt. F. H. Purchase; F/O. J. R. Rebbetoy; F/O. L. N. Selthun; P/O. J. V. O. Wood.

WOUNDED OR INJURED IN ACTION.—P/O. J. Kohut; Sgt. G. L. Lowe.

MISSING. BELIEVED KILLED IN ACTION.—Sgt. C. Z. R. Christianson; Sgt D. B. Fulton; Sgt. W. W. Kozicki; F/O. C. G. McDonald; Flt. Sgt. J. E. Ryan; W/O. K. G. Smalley; Flt. Sgt. J. A. O. Strachan; P/O. M. H Thompson.

MISSING.—F/O. R. E. Baht; Sgt. W. B. Ballantyne; F/O. J. J. Beaton; Flt. Sgt. J. T. Carter; P/O. S. A. Driscoll; Flt. Sgt. W. B. Eaton; Sgt. H. E Evans; Flt. Sgt. R. G. H. Gustafson; Sgt. W. H. Hamil; Sgt. M. C. Harrington; Flt. Sgt. F. J. Kelly; P/O. D. H. MacDonald; Flt Sgt. H. C. A. Maynard; Flt. Sgt. F. J. Neal; F/O. F. J. Parsons; F/O. W. C. Poole; Sgt. W. Robertson; Flt. Sgt. E. Rogers; Sgt. F. Rudd; Sgt. L. C. Skerry; F/O. F. G. Small; Sgt. A. J. Steinacker; P/O M B. Summers; F/O. S. E. C. Thorn; P/O. J. Wilde.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt E. MacD. Anderson; Sgt. G. F. Smith.

KILLED ON ACTIVE SERVICE.—Sgt. W. H. Evans; P/O. R. H. Highsted; P/O A. W. Howl; Sgt. G. C. McKenzie; W/O. B McPherson; Sgt. A. B. Shanks; W/O. G. B. Wigle.

DIED ON ACTIVE SERVICE.—P/O. W. J. Oliver.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Sgt. V. J. Sharp.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. B. F. R. Hotson; Flt. Sgt. A. J. Jenner; Flt. Sgt. K. R. Marshall.

KILLED ON ACTIVE SERVICE.—Sgt. J. M. Underwood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. C. W. Clare.

South African Air Force

WOUNDED OR INJURED ON ACTIVE SERVICE.—Lt. V. D. Van Rensberg.

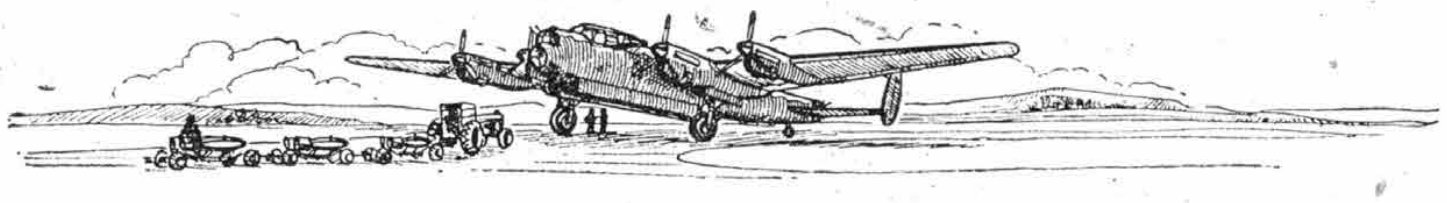
Official Corrections

Casualty Communiqué No. 325.

Under "PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION," delete Act. Flt. Sgt. F. W. T. Routledge.

Casualty Communiqué No. 326.

Under "MISSING" delete F/O. F. J. CHAPMAN, Flt. Sgt. J. E. GROUT, F/O. G. E. A. MADGETT, and P/O. R. P. MANTLE.



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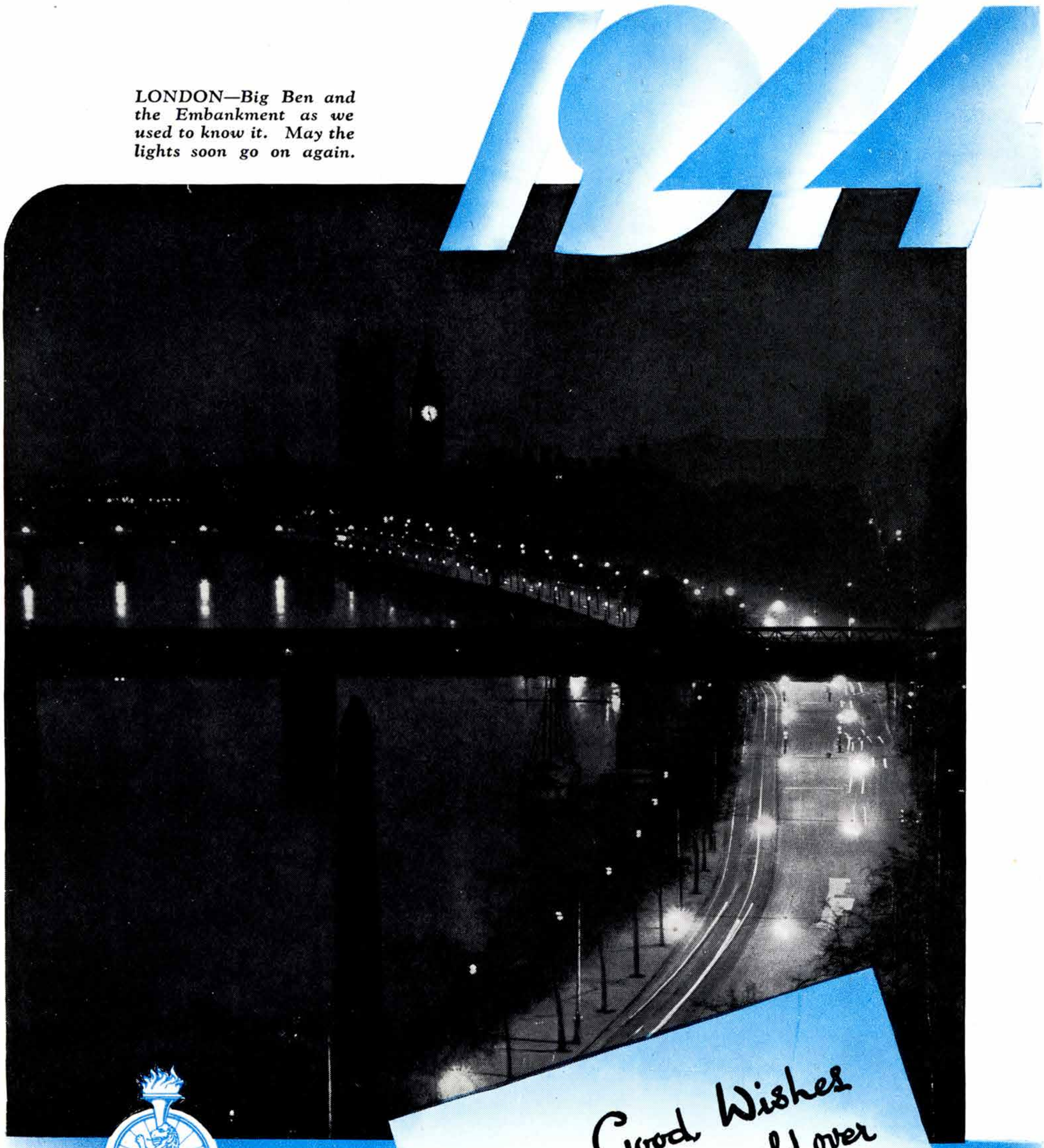

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