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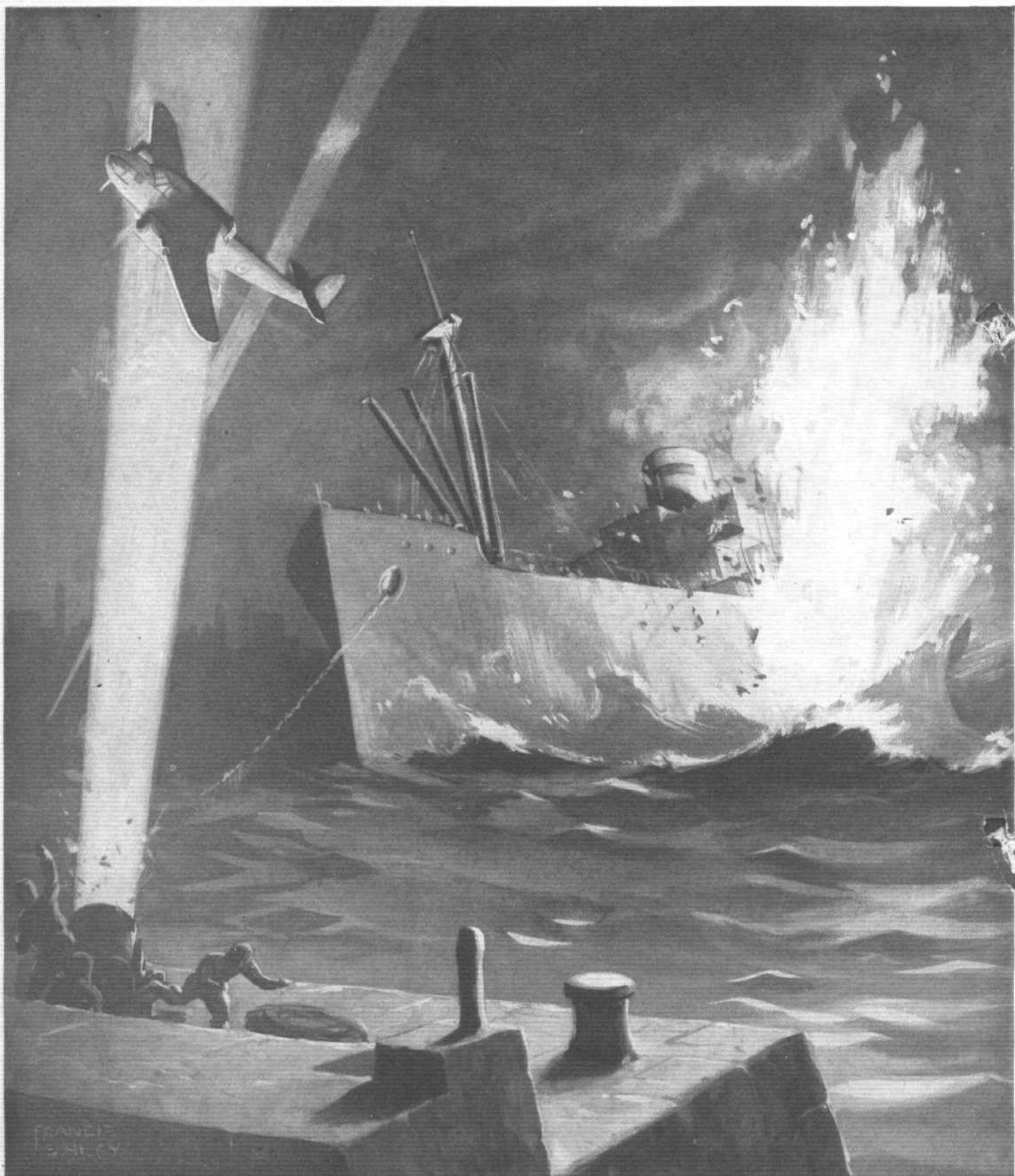
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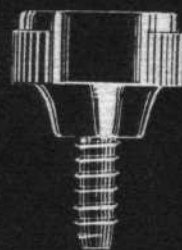
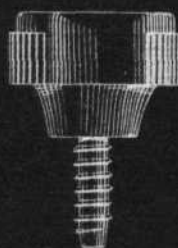
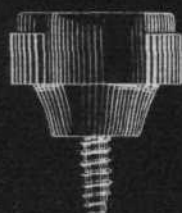
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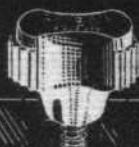


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Several reconnaissance flights were carried out over eastern Libya by bombing aircraft of the R.A.F. escorted by fighters. During the night of the 28th, a formation of Italian fighters was seen to be attacking a Sunderland flying-boat, which was seen to be attacking them. The Sunderland was seen to be attacking them. The Sunderland was seen to be attacking them.

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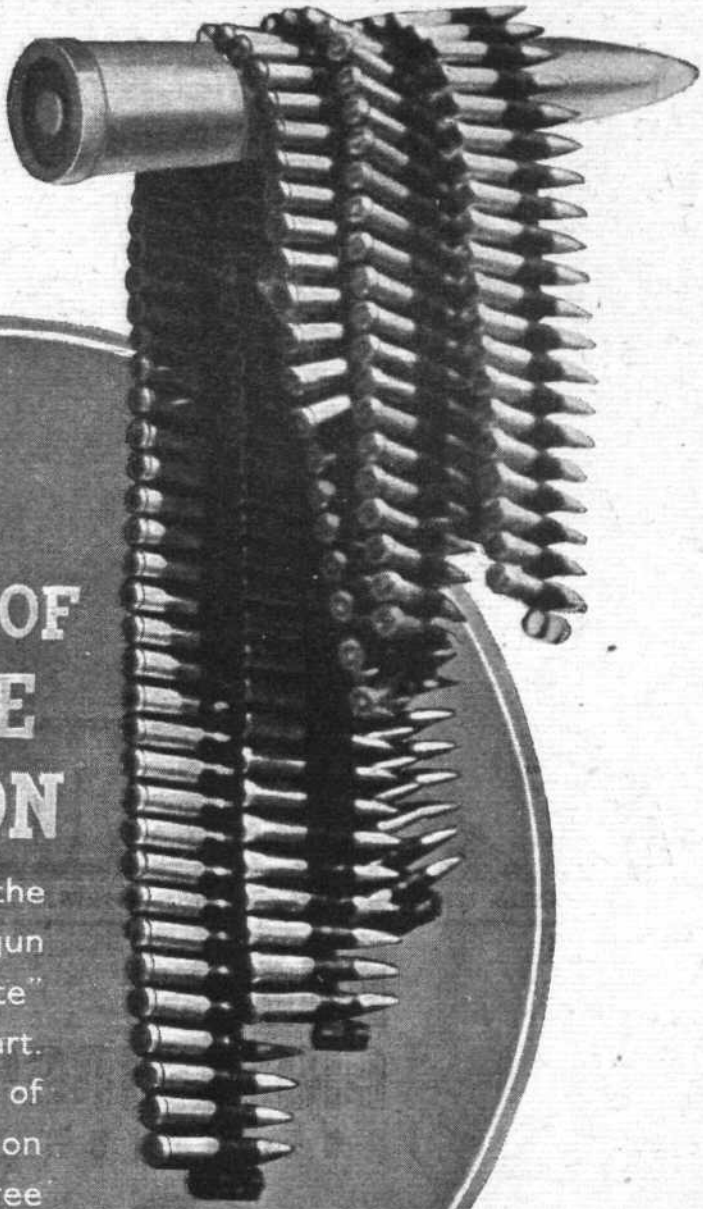
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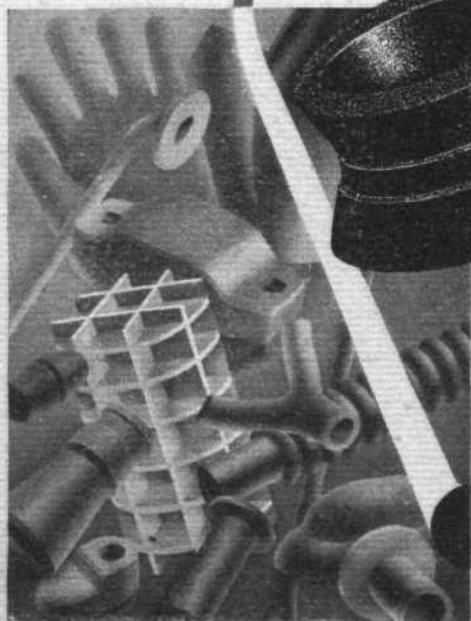
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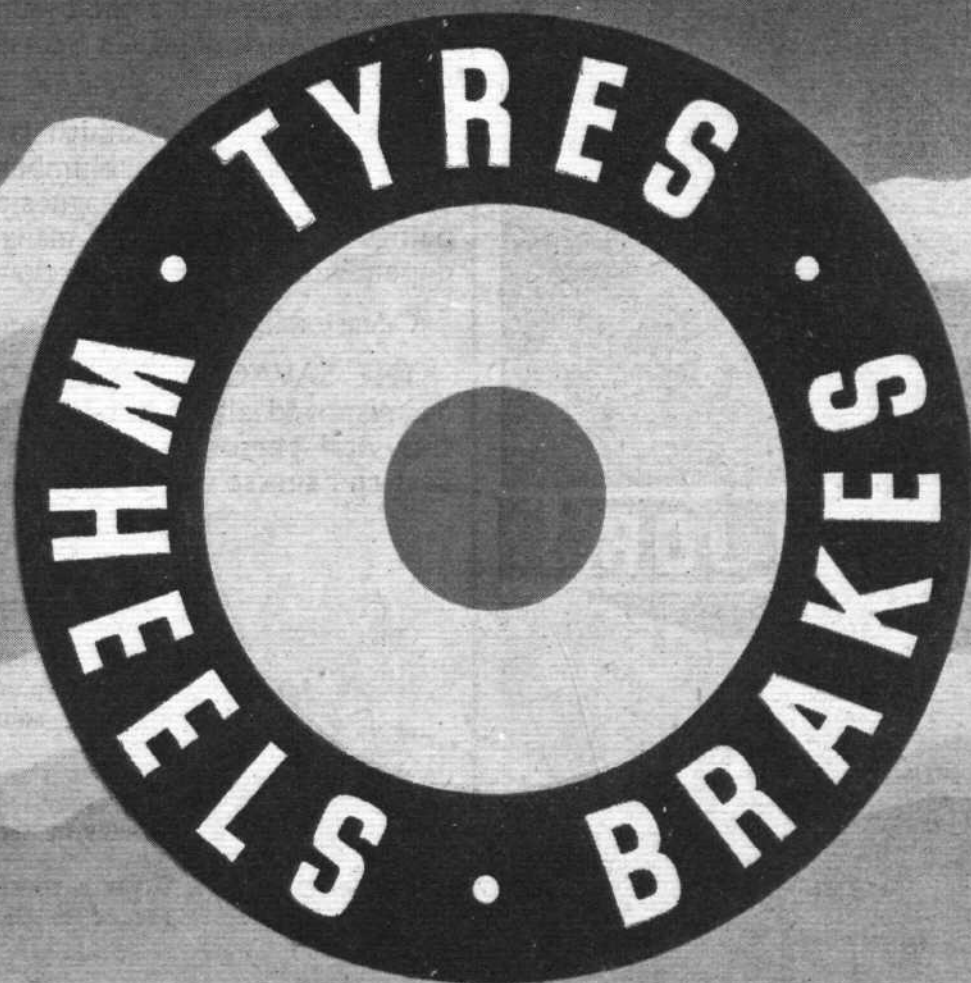
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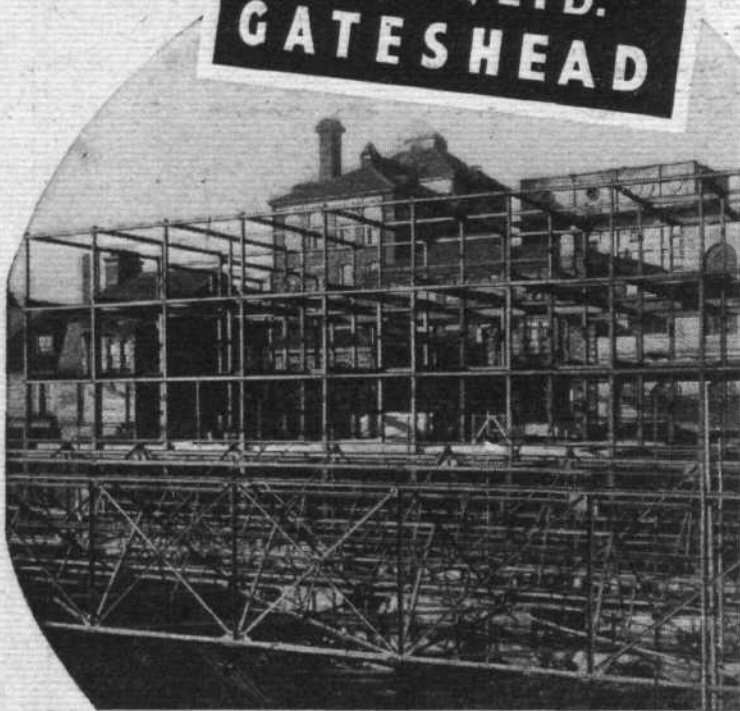
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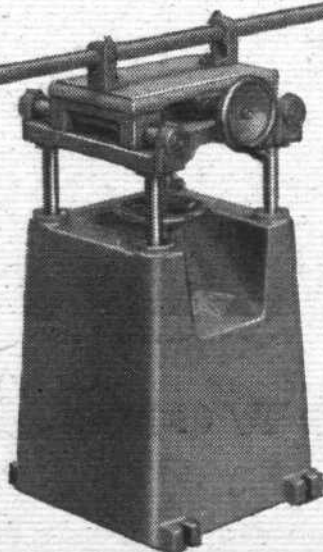
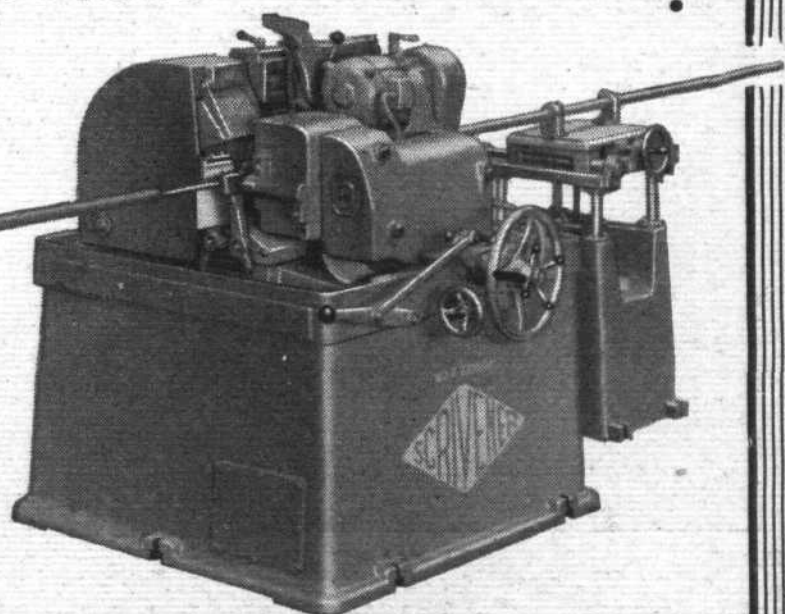
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FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Stukas Off Sicily

IT had been anticipated that the air contingent which Germany has lent to Italy would include a considerable proportion of the Ju.87 dive-bomber type. The *Luftwaffe* seems to set little store by those machines since the campaign in France came to an end, and to be willing to use them up as a rich man spends pennies at a fair. In truth the type is obsolete, and it never was good for much except co-operation with German tanks when the latter had outrun the support of the field artillery. However, in the action in the narrows of the Mediterranean off the south coast of Sicily, the Stukas have scored a degree of success more notable than any which has rewarded their efforts since they perforce turned their energies to naval warfare. They have planted bombs on H.M.S. *Illustrious* and *Southampton*, and damaged the carrier, while the cruiser was lost.

It has always been recognised that this narrow passage between Sicily and the island of Pantellaria would constitute the greatest problem for the Royal Navy if we were at war with Italy. It would always be a risky business to pass through it, but it was a risk which the Navy was resolved to take. In this case the Fleet achieved its object of escorting through the narrows a convoy of ships laden with important stores for the help of Greece, and so it can be said once more that air attack has failed to prevent the Navy from carrying out its work. This is all the more satisfactory because, according to correspondents who saw the action, the Stukas were evidently flown by the most expert and resolute German pilots. They lost some of their number from the ships' guns, and they afterwards were caught by the fighters from the carrier, and paid a heavy price. Two days later their base at Catania was raided by R.A.F. bombers, and over 30 machines, some of which were believed to be of the Ju.87 class, were destroyed.

The damage to the carrier and the loss of the cruiser

may be a nuisance to the Mediterranean Fleet, but this fight gives no ground for supposing that the intervention of the *Luftwaffe* will upset British naval supremacy in the Mediterranean.

Night Fighters

QUITE recently Air Ministry reports have begun to mention the destruction of German bombers by our night patrols, and two pilots have been decorated for their work as night fighters. It has been mentioned also that the *Defiant* was being adapted for night-fighting work.

Although the number of German bombers so far destroyed by night fighters has not yet been large, the above-mentioned facts show that some progress has been made on this side of the Channel in dealing with this very difficult problem. What the devices may be which enable the fighter to intercept the bomber at night have naturally been kept a close secret, but it is clear that the pilot must have some help. In pre-war days the defence authorities used to say frankly that without the help of searchlights there could be no interceptions by night. The searchlights are now outranged by the height at which the bombers fly. For a fighter to search for a bomber in the dark without some help would be a very hopeless task, especially at the speed of modern aircraft. The bursts of A.A. shells will sometimes be a guide of sorts, but if the gunners were fairly certain of the whereabouts of the raider, there would be the less need for the help of fighters. It is a natural deduction that the fighter pilots are getting help of some kind, and once a start has been made science is usually able to improve on the original method. We may hope for better things, though we may not get them soon.

It is obvious that the Germans, too, are at work on the same problem. Our night bombers catch glimpses of

German fighters by night more often than they used to do. We should expect the enemy to be on the search for an antidote to the night bomber, but the probability is that his researches have so far been less fruitful than ours.

Balloonists Spread Themselves

NOT for the first time in its history, the Air Ministry has had its knuckles fairly smartly rapped by the House of Commons Select Committee on National Expenditure. This time the criticism is that before the war the Air Ministry failed to provide for the proper administration of the balloon barrage organisation in its acquisition of sites and buildings. A case is cited in which a flight headquarters and a squadron H.Q. moved into an empty college and spread themselves into some 70 rooms, five courts, a pavilion, and a gymnasium, where they stayed for 15½ weeks. The price paid for rent, depreciation, outgoings and damages amounted to £2,200, and this was a reduction on what the college had first claimed.

The point of the criticism is that these matters were not dealt with by land officers, as they are called, who are experienced in dealing with such problems, but were left to officers who had no such experience. With the income-tax at 12s. 6d. in the pound and possibly about to go higher, it does seem deplorable that more public money should be spent than is really necessary for the proper conduct of the war. No explanation can be asked of the officer who was A.O.C. of the Balloon Command at the time, as he is now a prisoner in the hands of the Italians. He might be able to give a good reason if he could come before the Committee. His successor is an officer well known for his energy in other spheres,

and doubtless he will see to it that such things are better managed in the future.

Blimps?

FROM America comes news that Congress has approved the placing of substantial orders with the Goodyear Company for small non-rigid airships to be used for training and patrol work. Moreover, America is still free to order the building of the large rigid sanctioned long ago, although it is doubtful that this will be done. But the fact that the United States Navy is not abandoning altogether, as we have done, the use of airships is worthy of note.

There are people in this country who still believe that Great Britain was ill-advised in dropping all airship work, although the temptation to do so was great after the disaster to R.101. In the present war it would quite obviously be hopeless to revive the building of rigid airships, and it should be noted that even Germany has made no use of her rigids. But we have a source of supply of non-rigids in the Goodyear Company of Akron, Ohio.

In this issue we publish an account of a flight by the President of the Royal Aeronautical Society in a Goodyear "Blimp." The fact is not used as an argument in favour of reviving airships in this country, and the author himself makes no such suggestion. But he does state that he flew over the new Washington airport in that craft as a way of seeing the airport. Now it does seem that the Royal Navy might with advantage use non-rigids for escorting convoys and searching for commerce raiders. Their range should be sufficient to reach mid-Atlantic or thereabouts, which would help.



HATCHING THE AIR TRAINING CORPS: The Air Minister discusses plans with his officers. In this group are, from left to right, Wing. Comdr. Lord Nigel Douglas-Hamilton, of the Department of the Air Member for Training; Capt. H. H. Balfour, Under-Secretary of State for Air; Sir Archibald Sinclair, Air Minister; Air Marshal Garrod, Air Member for Training; Mr. J. H. Wolfenden, Director of Pre-Entry Training; and Air Cmdr. Chamier, Commandant of the A.T.C.



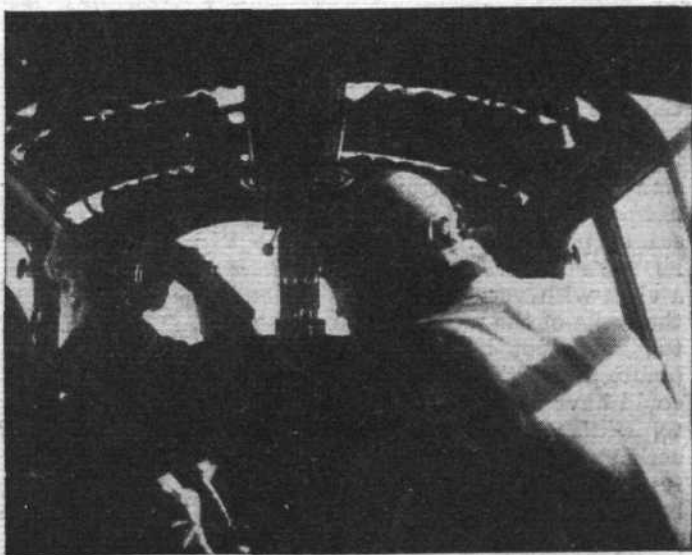
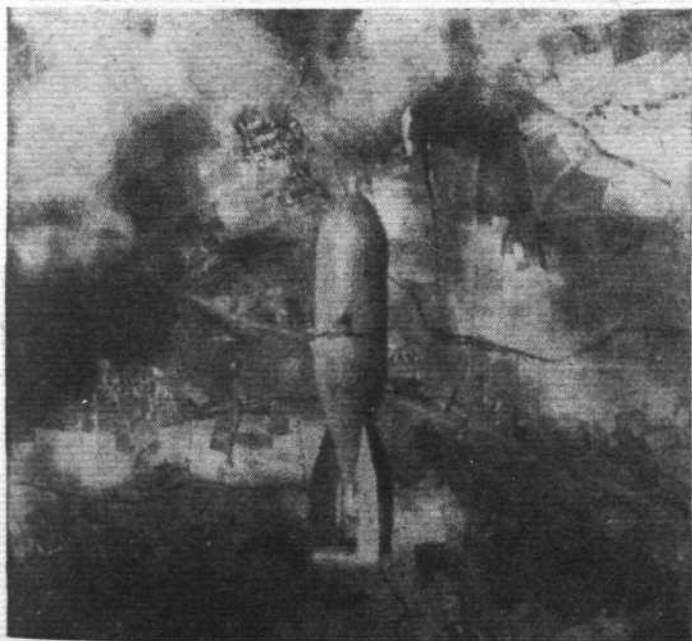
ENGLAND'S ICY MOUNTAINS : Three Blackburn Bothas in formation over snow-clad hills.

War in the Air

Hitler's Stukas Score : H.M.S. "Illustrious" Bombed : Vengeance at Catania

THE help which Hitler sent to Mussolini has taken shape. It was made manifest in an attack by fifteen Ju 87 dive-bombers on a British convoy, escorted by a strong naval force, which was taking important material to the help of Greece. The convoy was passing through the narrows of the Mediterranean on January 10 when it was attacked. It had always been recognised that the passage of the narrows, between Sicily and the island of Pantellaria, would involve a certain amount of risk. The rocky island has been strongly fortified by the Italians, and big guns have been mounted there. This makes it advisable for British ships to steer closer to the shore of Sicily, for at its narrowest part the channel is only some 80 miles wide. The attack began at dawn with a sortie by two Italian destroyers from Pantellaria, one of which was sunk by the fire of the British ships. Then

two Italian torpedo-bombers appeared, one of which launched its torpedo harmlessly, while the other retired without even having a shot. At 1.30 p.m. the dive-bombers appeared and attacked out of the sun. They came down with great skill and resolution, and planted bombs on two of the British warships, the cruiser H.M.S. *Southampton* and the carrier H.M.S. *Illustrious*. The *Illustrious* reached port under her own power, but the fire in the *Southampton* could not be quelled, and the ship had to be abandoned and then was sunk by her consorts. Other attacks by diving and from a height were made during the afternoon. The fighters from the carrier were in the air, and after the first attack they engaged the Junkers 87s and shot some of them down. Altogether, twelve



(British Paramount News Reel).

FUTILE CRUELTY : Photographs taken in and from a Japanese machine bombing Kunming in the Yunnan Province. Eighteen twin-engined Mitsubishi bombers took part in the slaughter.

WAR IN THE AIR (Continued)

enemy machines were destroyed in the action and others were damaged. The convoy got through unharmed. On the night of January 12-13 the aerodrome at Catania in Sicily was heavily raided by the bombers of the Middle East Command, and over 30 machines, believed to be mostly of the Ju 87 type, were destroyed. The raid was repeated on January 15.

The Balance Sheet

THAT is a brief account of the action, compiled from the Admiralty account and from a very clear and balanced report written by a correspondent of the British United Press who was on board one of the warships. He was convinced that the German pilots who took part in the attack were picked men of high skill and courage. That makes the certain loss of twelve of them and the probable loss of more a blow to the German contingent in the Mediterranean which is not negligible. There have been bombing attacks on moving British warships before in this war, but none of them achieved any important results (one bomb on the deck of H.M.S. *Rodney* failed to pierce the deck armour), and for the most part the German pilots have wilted when faced by the terrific fire poured up by the warships. On this occasion they faced it and went through it, though at any rate a few of them were hit during their dives. The number of bombs which scored hits were certainly a very small proportion of the total discharged.

It is not to be denied that the damage to one of our carriers must be a handicap to Admiral Sir Andrew

In Albania, and more especially in Libya, the *Regia Aeronautica* is a beaten force, beaten even more completely than the Italian land forces have been beaten. The supremacy in the air which the R.A.F. has established in Libya is one of the most impressive happenings of the present war. Everybody has heard a great deal about the notable part played by the *Luftwaffe* in the conquest of Poland and in the Battle of France, but in neither of those cases was there any effective air opposition. The same applies to the campaign in Norway. Any armed body which is not opposed by its appropriate counterpart will make a great difference in winning a victory. The case of Libya is quite different, for there the Italians were in strength. They started with a superiority in the air, both of bombers and of fighters, and they have been so beaten that now it is rare for an Italian machine to be seen in the air. The advancing British troops have hardly been troubled at all by Italian aircraft, and they have captured over 100 damaged Italian machines on deserted aerodromes. It is quite an amazing air victory.

It is doubtful whether it will be thought worth while to send any of the German contingent to Libya. Nominally this contingent is under Italian orders, and the Italians might like to send some of the Germans there; but if Germany did not consent to that move she would no doubt have her way with her junior partner. So far as dive-bombers go, without strong fighter escorts they would be at the mercy of the Hurricanes in Libya, and would be of little use. The Germans would hardly be likely to send more useful and expensive classes of bombers to Libya in the forlorn hope of converting defeat into victory. Marshal Graziani's army is past praying for, and even efficient air help could not now put it in a winning position.

German machines may well appear in Albania. There is now at least a chance that the Italians will be able to hold their defence lines round the ports, and air help would be very



NO BYES ALLOWED: (Left) Pilots of No. 601 County of London Squadron, A.A.F., indulge in a game of cricket on the tarmac.

WINDY CORNER: An open machine-gun port for broadside protection on an Italian bomber.

Cunningham, for carriers have proved very useful in the Mediterranean, and the loss of a cruiser is also a matter for much regret. But the absence of these ships will not alter the position in the Mediterranean. It will not drive the Royal Navy out of that sea or prevent it from carrying out its work there. The dive-bomber is a class with very limited utility, and the scene of the recent action is about the only spot in the Mediterranean (apart from the Adriatic) where it could have a chance of doing damage to British warships. Perhaps this action may cause our Admirals to take further precautions when they next have to pass through the narrows, and that is probably the only effect which it will have on future operations.

It is interesting to speculate as to what part the German air contingent will play in the two land campaigns in which Italian armies are engaged.



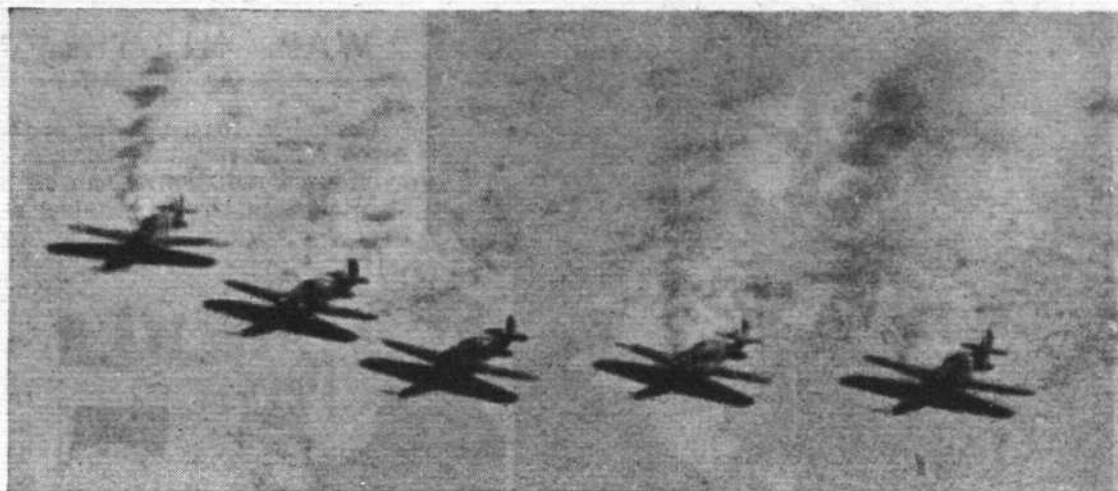
Associated Press

WAR IN THE AIR (Continued)

NOT SO DUSTY:

Hurricanes raising a sand-storm as they take off in formation on the Western Desert. These eight-gun fighters have proved themselves as useful on the desert as they were in Europe.

From a Paramount News Film.



welcome to them. In that campaign, too, the *Regia Aeronautica* shows every sign of being a beaten force. Like the rest of the Italian troops which invaded Greece, it had expected a walk-over. If opposition was offered, the Greek flying corps was tiny, and the *Regia Aeronautica* was large and could overwhelm it. The Italians seem to have forgotten the Royal Air Force. That supplied the one great deficiency in the Greek defence system, and the Italian airmen found themselves confronted by the best pilots in the world. The promptitude with which some air help was hurried to Greece made a lot of difference, and the quality of British airmen and British machines did the rest. The *Luftwaffe* may bring a new spirit into the operations in Albania; but the R.A.F. is no more to be overawed by the *Luftwaffe* there than it is in Northern Europe. Our airmen know that man for man and machine for machine they are better than the Germans, and they are not likely to let the Germans forget that fact.

The Road to Victory

ALL over the Western Desert is strewn the wreckage of the Italian Air Force shot down by the Royal Air Force during the recent offensive. It is not necessary to leave the "Road to Victory," as the Italians named the highway they built across the desert from Sollum to Sidi Barrani, to find evidence of the aerial battles that took place. At Sidi Barrani itself an S.79 stands silhouetted against the setting sun as one approaches from the direction of Mersa Matruh. The pilot made a brave effort to regain the aerodrome after he had been badly shot up by an eight-gun fighter, and he came to rest only a few yards outside the landing ground. Three of his crew were dead and he and the remainder were soon on their way to prison camps. Not only the crew, but also a would-be rescue party who came out from the shell-torn town, were captured. Between Sidi Barrani and Sollum there are to be seen further examples of the destruction created by the Royal Air Force. One C.R.42, shot down by a sergeant-pilot, who bagged another the same morning, came down at such an angle that it remained there—stuck on its nose. Everybody who has passed along this inaptly named "Road to Victory" has seen it too. Nobody can miss it as it stands poised there. And so it is, all along this wide roadway, where at each five-kilometre mark there is an inscription recording the name of the Italian unit which had helped in its construction. At Upper Sollum, on the aerodrome—which was greatly enlarged for the R.A.F. not very long ago—there were aircraft abandoned practically, if not completely, intact. Round each of them the Italians had placed a number of thermos flask bombs.

Across the frontier there are the remains of what once was Fort Capuzzo. There is very little left of this fort, named after one of the Italian commanders who assisted in quelling disturbances among the inhabitants of this corner of Libya. Not far beyond the fort is the Italian aerodrome, and here there were several burnt-out aircraft. Either they were deliberately set alight by the Italians or they were fired during the fighting on the ground.

The search for a large party of Italian Generals and senior officers is still being carried out by Hurricane

aircraft of the R.A.F. These Italians escaped from Bardia, and were making for Tobruk along the coastal paths, before Bardia was surrounded and finally taken. R.A.F. Hurricanes are flying low, sometimes skimming the cliffs at fifty feet and spotting lurking Italians who are taking refuge in caves. A few days ago a Hurricane observed a small party of Italian officers hiding by the water's edge. A naval unit was advised, and a British motor boat immediately took up the chase, which resulted in the capture of the party, one of whom was General Argentina, who was in command of Sidi Barrani.

Yet another story is to hand of a young R.A.F. fighter pilot who, single-handed, has just been responsible for taking a band of about 150 Italian prisoners. He was carrying out a routine patrol near Marsa Beddau, when he saw a small concentration of armed soldiers. At first he thought they were British, but later, flying low, he recognised their dusty green uniforms and large hat badges. The pilot swooped low, fired a burst over the heads of the troops, circled and "ushered" his captives towards a British military unit, who soon relieved him of his responsibility.

The Northern Theatre

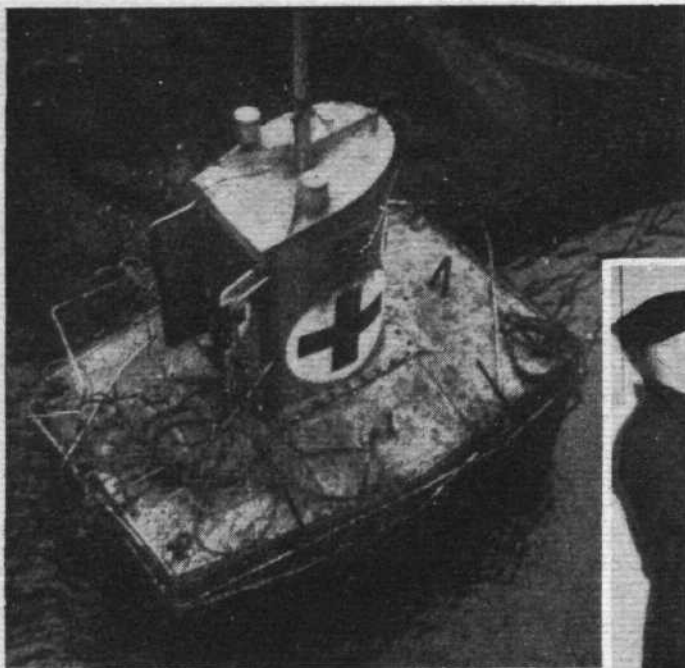
IN the bombing competition with Germany, both the R.A.F. and the *Luftwaffe* have continued to strike regular blows, each typical of its own methods. The Germans continue to raid by night whenever the weather is favourable, selecting British cities which are certainly important and which contain military targets, but not showing much discrimination as to where they drop their bombs. There have been several more raids on London, in each case heralded by showers of fire bombs, but these have been tackled with promptitude and skill, mainly by ordinary householders, and there has been no repetition of the great fire in the City. Portsmouth and Plymouth have each suffered severe raids, and, of course, the Thames Estuary is a standing dish.

But there are increasing signs that the German night bombers will not always find their occupation easy and comparatively safe.

The growing experience of our night fighter pilots is beginning to show results. More raiding bombers are being intercepted, and those that do get through are being attacked with some success. The number of our night fighter squadrons is steadily increasing, though necessarily slowly. Pilots must be taught a new technique of fighting, much of which is still experimental; aircraft must be adapted, and, even under the most favourable conditions, the difficulties of trailing enemy bombers, flying at some 250 m.p.h. through the blackness of night, are still severe.

The enemy is working on similar lines; our bombers are now encountering night fighters on their raids over Germany, and several of these have been shot down. So far, the night tactics of the Royal Air Force have proved more successful than those of the enemy, because none of our night fighters has been lost in action.

The first D.F.C. for night fighting has been awarded to Flight Lieutenant John Cunningham. His first successful action was over the South coast. After following an enemy



STUKAS SANCTUARY: The interior and exterior of one of the floating rescue pontoons anchored in the Channel for *Luftwaffe* pilots who have had to swim for it. *British Movietone News.*



WAR IN THE AIR (Continued)

December, 1935, meeting of the American Association for the Advancement of Science. The device picks up the infra-red radiations given off by any hot object (in this instance an airplane engine) at night or in the daytime.

Infra-red rays pass freely through haze and smoke to reach the sensitive instrument, but any fog, except a very thin one, stops them."

The R.A.F. has likewise continued its systematic raiding of places where it can damage the enemy's war effort. The day raid on January 10 over the Pas de Calais, when our bombers went over with a strong escort of fighters, was a novel effort, and probably gave Field Marshal Göring some food for thought. It is a standard German doctrine that day raiding gives better results than are possible by night, and with that the British authorities are not likely to disagree. Obviously

bomber for ten minutes and climbing to nearly 20,000ft. (the temperature was 50 deg. below freezing point), he put in a single, well-directed burst of fire lasting only four seconds. The raider, struck amidship, blew up with an explosion which the official report described as a "fire-work display." A few minutes later he sighted another enemy bomber flying above him. Undetected, he manoeuvred himself into position, and then, easing up the nose of his aircraft, opened fire. Streams of tracer bullets could be seen striking the engines and cutting into the port wing. Both gunners were apparently killed or wounded with the first long burst, as there was no return fire. For about thirty seconds after the attack, the enemy bomber flew on an even course, then, with engines almost stopped and streaming vapour, it turned slowly to port and dived towards the sea. Turning inside the enemy aircraft, the fighter pilot followed him down and saw the angle of the dive becoming rapidly steeper, until, apparently out of control, the bomber plunged into the cloud layer at an angle of fifty degrees from the horizontal.

Our Canadian contemporary *Commercial Aviation* has published the following speculation about the night-fighter problem. We reproduce it, without comment, for what it is worth:—

"It is thought in U.S. scientific circles that the new British 'secret weapon' which appears to be an ultra-sensitive means of detecting the presence of enemy aircraft regardless of weather condition, is in effect 'an infra-red ray telescope' similar to one shown by Dr. Vladimir K. Zworykin, of the Radio Corporation of America, at the

the Germans only abandoned day bombing because it had failed to achieve its purpose, and was growing too expensive. While the Germans were approaching our coasts at all hours of the day, our defence fighters had to remain at their posts. "Now it has been found safe to send our fighters across the Channel.

Another straw has shown which way the wind is blowing, or, to vary the metaphor, more coming events have cast a shadow before. Germany has lost her first bomber to American fighter aircraft flown by British pilots. Flying Grumman single-seater fighters, naval pilots have shot down a Ju. 88 bomber, all four occupants of the German machine being captured. Three of these aircraft were on patrol when weather conditions necessitated recall to their base. The leader had actually landed when he caught sight of the Ju. 88. He promptly took off again, and, climbing back into the clouds, rejoined his two companions just as one of them opened fire on the raider. The Ju. 88 eventually crashed into a bog.

The Air Minister at Glasgow

SPEAKING at Glasgow last week, Sir Archibald Sinclair, Air Minister, drew attention to a branch of R.A.F. work which is useful, probably monotonous, and certainly dangerous, but which has not received much public recognition, namely, the laying of mines to interrupt German sea communications. Sir Archibald said: "We heard much about our own losses at sea, but less about the German losses at sea and the work of our gallant Hampdens and Beauforts and the Swordfish of the Fleet Air Arm who laid the mines in the paths of German ships. It was work as dangerous and highly skilled as bombing.

The Air Minister also gave some figures about air losses inflicted and suffered by the Middle East Command. In Greece, he said, our airmen, besides inflicting heavy damage on Italian bases, especially Valona and Durazzo, had definitely destroyed 56 Italian aircraft for a loss of 19 British machines. In Malta our defences had destroyed 42 Italian aircraft for a loss of 25 British. In Libya, since the battle started, the R.A.F. had destroyed 90 Italian aircraft in the air, and some 115 on the ground, for a loss of only 17 British machines.

Since Sir Archibald made his speech there has been more fighting at Malta. The Italians or Germans have made heavy bombing attacks there, on January 18 and 19, and an Italian communiqué claimed that H.M.S. *Illustrious* had been hit again by a dive-bomber. The enemy machines, however, lost a high proportion of their number.

AIR LOSSES TO JANUARY 18.

	GERMAN Aircraft	BRITISH Fighter Aircraft	Pilots	ENEMY in Middle East Say 35 at Catania + 6	BRITISH in Middle East
Jan. 12	—	—	—	41	2
" 13	—	—	—	2	—
" 14	—	—	—	—	1
" 15	2	—	—	—	—
" 16	1	—	—	10	1
" 17	2	—	—	1	—
" 18	1	—	—	10	3
	6	0	0	(say) 64	7

British bombers lost over German territory: Jan. 12, 4; Jan. 15, 1; Jan. 16, 5; Total, 10.

German losses by R.A.F. and ground defences in Northern Area, 4196. British aircraft lost in Northern Area, 1714.

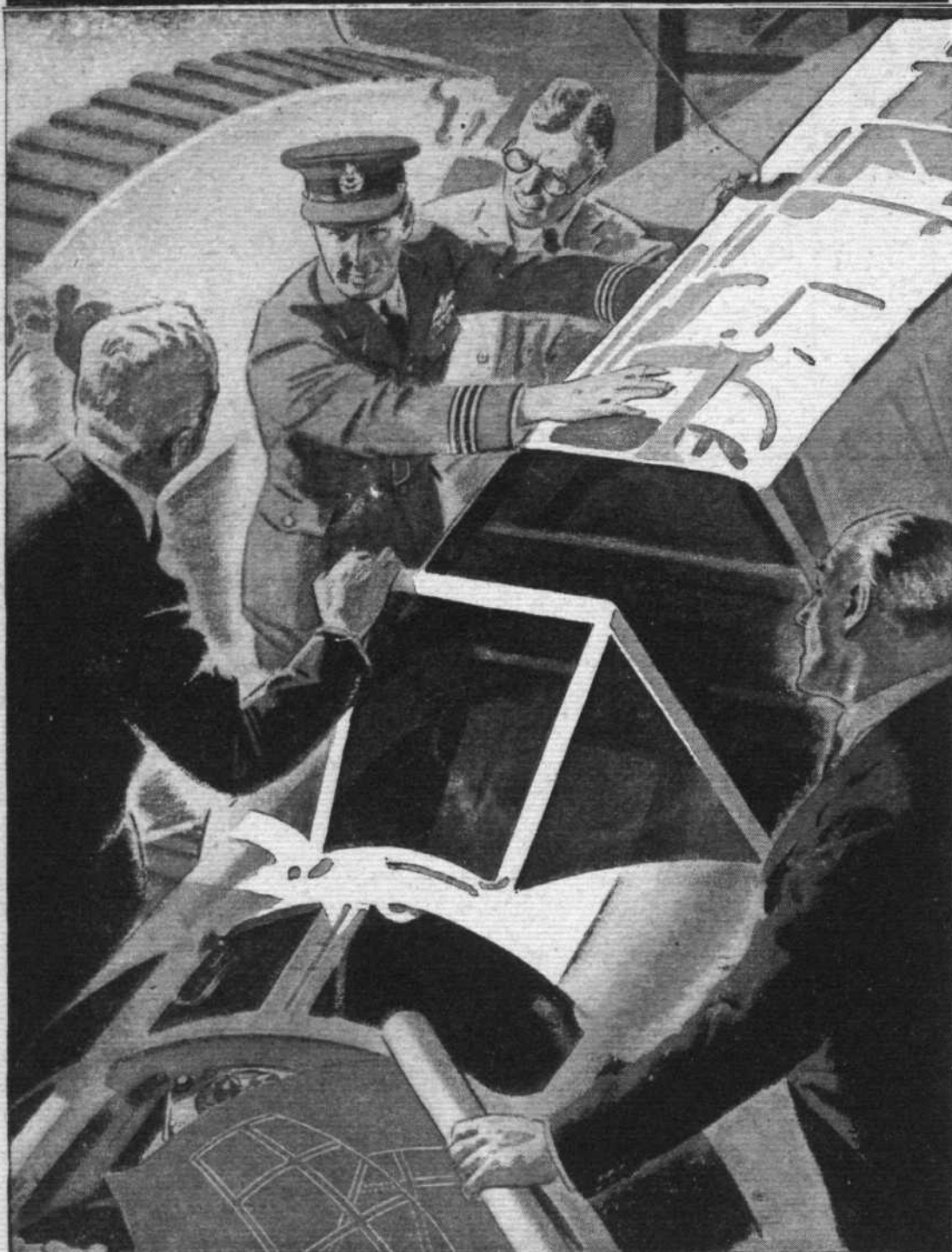
In the Middle East the R.A.F. have destroyed about 671 enemy aircraft and have lost 86.



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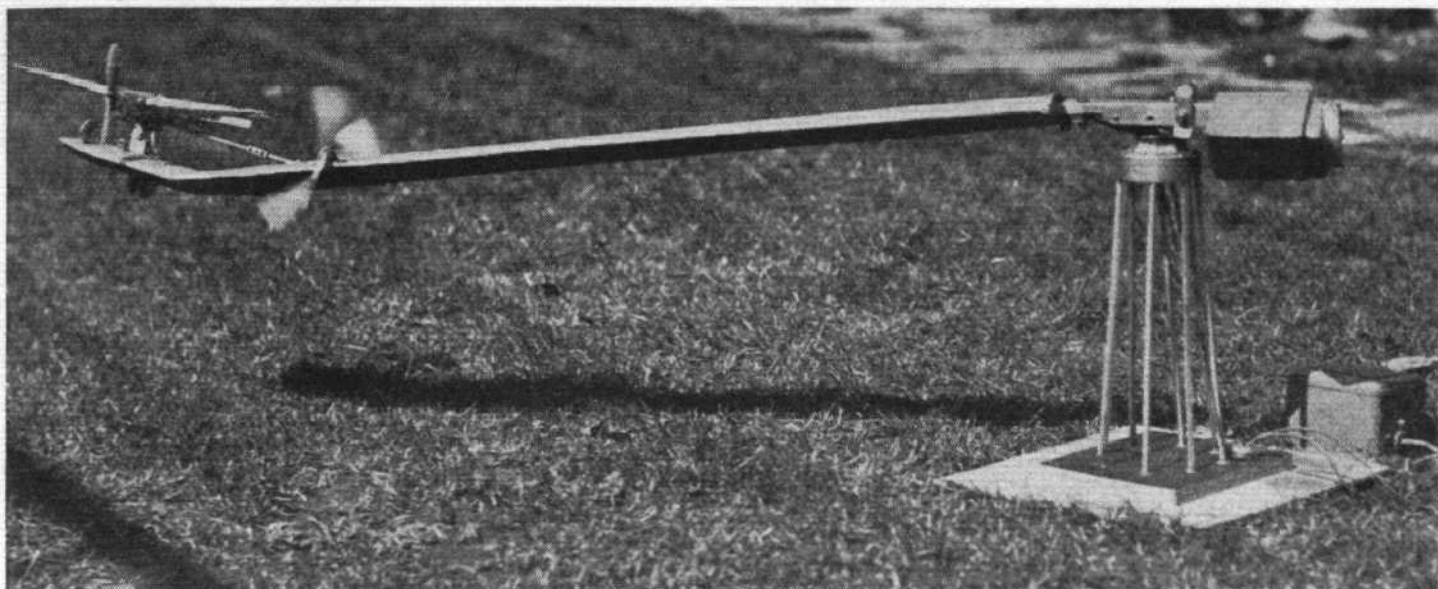
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method of adhesion, you may still find it will pay you to call in the BOSTIK MAN who can advise you on the many new uses and improvements of BOSTIK.

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A working model of the Shead take-off assister. At slightly greater speed the captive wing rises higher so that the aeroplane is on a banked turn at the moment of release.

A CAPTIVE COMPOSITE

*Novel Variation on an Old Theme : Catapult, Composite and Slip-wing Combined :
Rapid Launching Without Unpleasant Acceleration*

THAT problems of assisted take-off have stimulated the imagination of inventors is shown by the many different forms which have been suggested. First we had the catapult, which has come to be used almost exclusively on board ships. We say "almost" intentionally, because France had, at one of her naval bases before the war, a catapult permanently mounted on the quayside. We do not know if this is still in existence, or if it has been destroyed by the R.A.F. If it has not, it is conceivable that it is being used by the Germans.

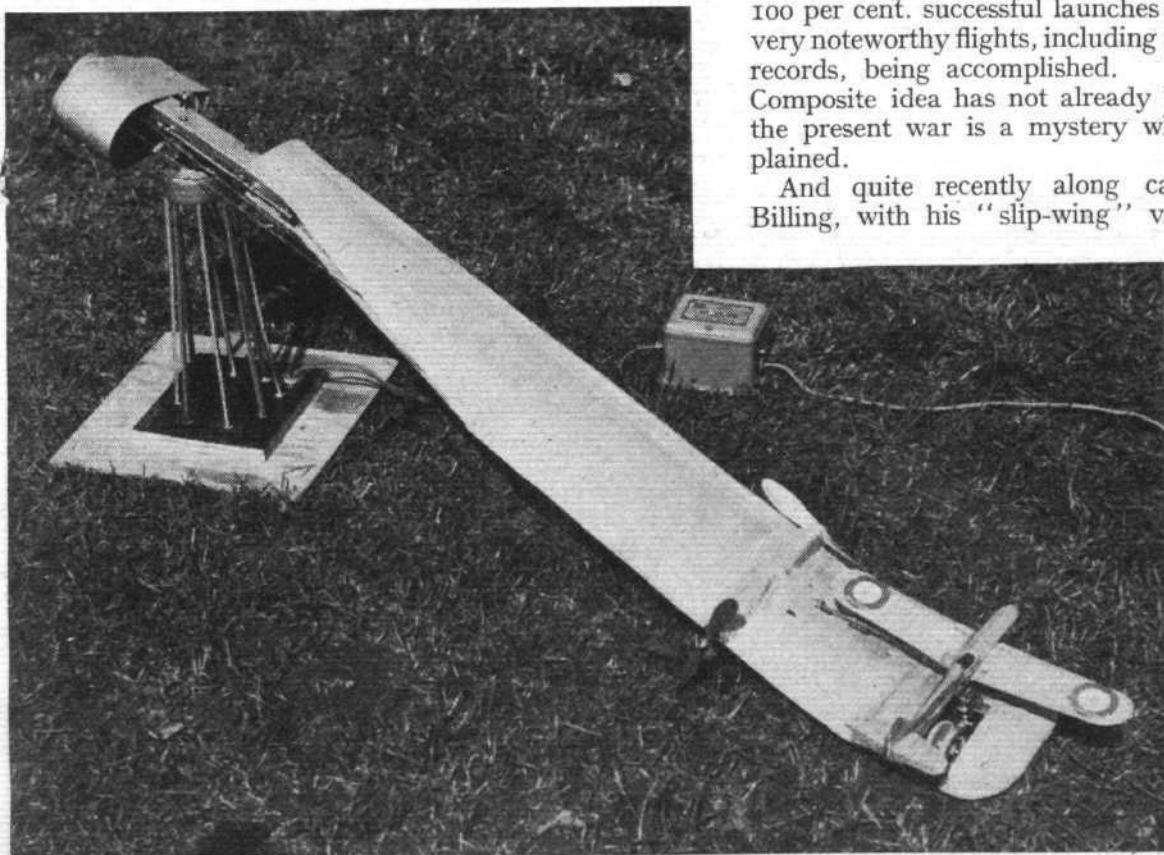
A variant of the catapult was the ground accelerator designed by Farnborough some years ago. In the

accelerator scheme the aircraft ran along the ground on its own wheels, but acceleration was assisted by a compressed-air engine which wound a long cable over large drums. The ground accelerator was a somewhat "Heath Robinson" affair, but it does seem to have been capable of development. The Wright brothers were, of course, the first to employ a ground accelerator, their method being to use a starting rail, a short tower, and a dropping weight.

Then came the Short-Mayo Composite, in which a large but lightly-loaded lower component carried on its back a small but heavily-loaded long-range aircraft. This combination definitely proved itself, a number of 100 per cent. successful launches being made, and some very noteworthy flights, including some which established records, being accomplished. Why the Short-Mayo Composite idea has not already been taken into use in the present war is a mystery which has not been explained.

And quite recently along came Mr. Pemberton-Billing, with his "slip-wing" variation of the Mayo.

As full details were published so recently in *Flight*, it is scarcely necessary to do more than recall that the P.B. slip-wing is a large, low-powered aircraft mounted on top of the small, heavily-loaded long-range machine. In other words, Mr. Pemberton-Billing has



At rest. Features to note are the counter weight and the tandem airscrews.

A CAPTIVE COMPOSITE (Continued)

reversed the Mayo arrangement, although it may be taken for granted that Major Mayo looked into the possibilities of the "mother bird carrying the long-range machine in its claws instead of on its back," so to speak. We believe that he came to the conclusion that one could not afford to add the necessary undercarriage weight to the long-range machine.

Yet another variation was the scheme proposed by Mr. King, in which an aircraft with a fuselage intermediate between the normal fuselage and a flying boat hull was to be launched from a twin-float cradle, the idea being that the aerodynamic efficiency of the long-range aircraft would be equal to that of a landplane, while the weight of the undercarriage was saved, and the long-range machine would be able to alight on water at the end of its flight.

In this brief review of the different schemes that have been proposed or actually tried-out, mention should also be made of that suggested by Capt. Frank Courtney. He designed a rail track with a trolley, and to reduce the power required, and shorten the take-off run required, the idea was that a downward slope should be given to the track.

Rocket Assistance

And finally there is the use of rockets to assist the take-off. Dr. Lanchester looked into this subject from a theoretical point of view in articles published in *Flight* some time ago. Since then it is believed that the Germans have actually adopted the rocket-assisted take-off. It is, of course, well known that jet propulsion is relatively inefficient at low translational speeds, but can provide high efficiency when the forward speed is high. As, however, the rocket is comparatively light for the power it can develop, and the installation on an aircraft need not be unduly heavy, or particularly complicated, it may be expected that rocket-assisted take-off can be made effective if not very efficient.

To the variety of assisted take-off schemes outlined above has now been added yet another. This is the invention of Mr. B. B. Shead, and may be termed a captive composite. Our photographs show a working model which Mr. Shead erected in his garden. These pictures indicate the general idea, although many detail

variations are, of course, possible. One may, perhaps, regard the Shead composite as the "whirling arm" used by the N.P.L. and Farnborough for airscrew and other research, but with the "arm" encased in an aerofoil section and turned into a lifting wing.

At first sight the idea seems, quite frankly, to be fantastic. "What," one immediately asks, "will happen to the aircraft when flung off the merry-go-round tangentially?" The inventor argues that as the long captive wing is revolving comparatively slowly, centrifugal force will not be excessive, and anyway, the aircraft is banked to approximately the correct angle for the speed and radius of turn. The intention is that a large wind indicator should be mounted on the top of the tower so that the pilot can pull his release just before the aircraft is turning into wind.

It may be, of course, that an outward skid is desirable at the instant of release. One would imagine that, since the aeroplane is mounted at the tip of the captive wing, the latter would tend to rise sharply when relieved of the weight of the aircraft, so that there might well be risk of collision. As Mr. Shead has made provision for tail surfaces for the captive wing, and has mounted it on the tower by a universal joint, arrangements could presumably be made for decreasing the angle of incidence of the captive wing at the moment when the separation occurred.

As for the mechanical details, the intention is that the engines of the captive wing should be aero engines (in the working model they are represented by an electric motor). They could be mounted in tandem and this is actually represented in the model. Pipe lines would lead from the tower to the engines, and there is an automatic device which throttles down the engines at the instant of separation. The captive wing then "glides" to the ground along its spiral path, and when the wheels touch, the engines are automatically switched off.

Mr. Shead points out that as the cradle on the captive wing is close to the ground, a ramp can be provided which will make it possible to get the next aircraft loaded-on very quickly, so that the possible frequency of launch should be fairly high. This would be important if bombers were being launched. Another advantage claimed is that different types could be launched.

America's Use of Motor Industry

FOR her aircraft production programme America is to make extensive use of her motor car industry. Exactly how it is to be done is a matter to be decided by a survey now taking place. According to our New York contemporary, *Aviation*, planning has gone farthest in the matter of bombers, and it is likely that a four-engined heavy bomber will be included. It is thought that its design will probably be based on the Consolidated B-24, and there are to be 4,000 of these. Some 8,000 twin-engined bombers resembling the Martin B-27 are to be built in addition. It is believed that 8,000 fighters will be included in the programme, but the type to be adopted is still in doubt. Of these 20,000 aeroplanes Great Britain is, according to *Aviation*, to receive approximately 12,000, equally divided between bombers and fighters.

The intention is that the American automobile industry is to produce parts for these aircraft, and sub-assemblies up to tail and wing portion size. The general idea is that the American automobile industry can make available a number of general-purpose machine tools by working three shifts on its remaining tools. It is not thought that production of dies will present a serious difficulty, as the tool and die shops in Detroit, with some 10,000 workers, are at a low level of activity at the moment.

Final assembly cannot be done at the automobile factories, so that special factories are to be built for assembly. These will be paid for by British and American funds. The assembly

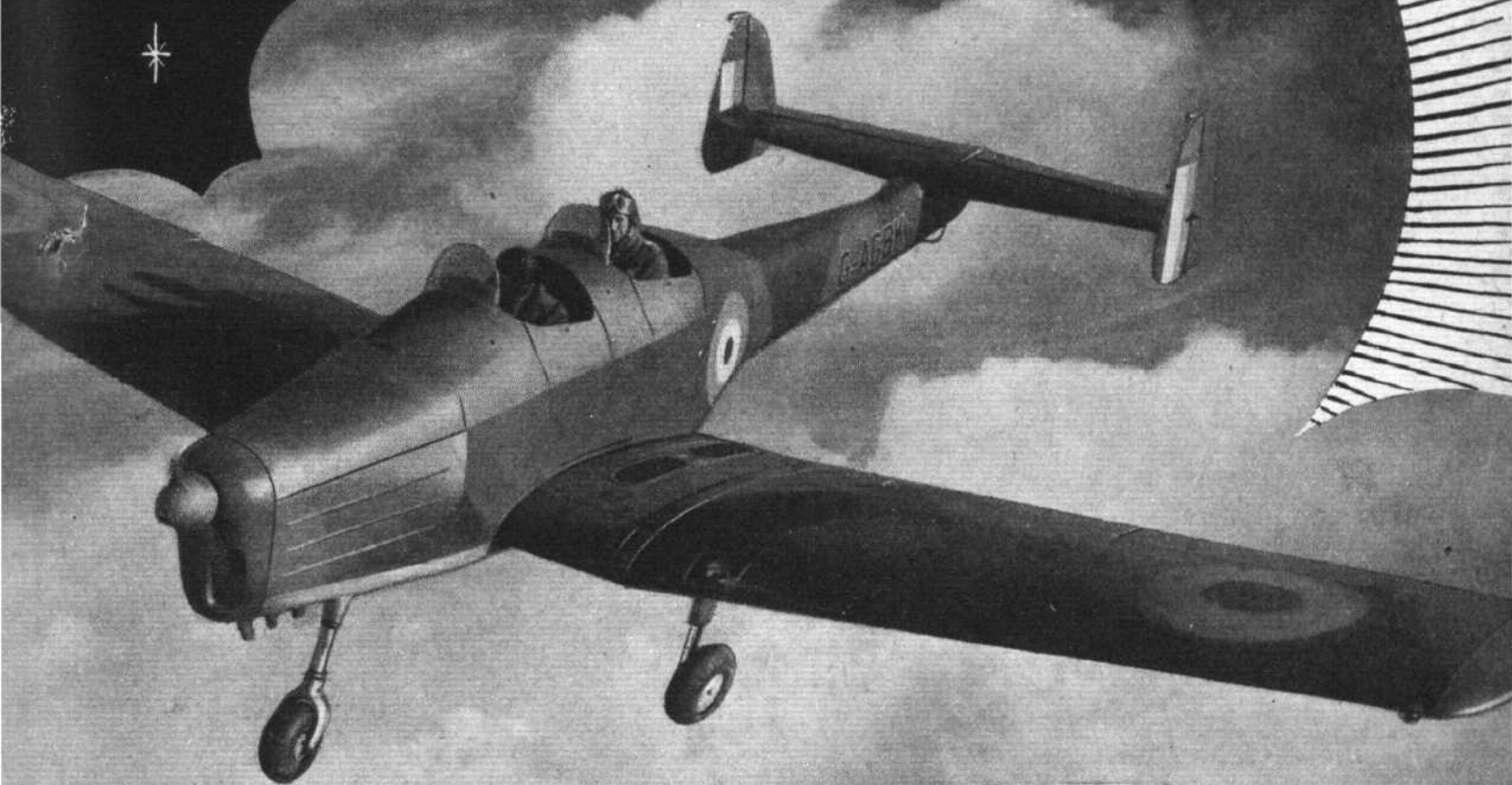
plants will have to be managed by experts drawn from the aircraft industry, and our contemporary points out that "the industry's executive and supervisory forces are already spread out so thin as to have an adverse effect on production. If the programme is treated as an emergency programme, for immediate production, the methods in use in the aircraft factories will be duplicated. On the other hand, if a long-term policy is decided upon, special tools would have to be produced, and it would take longer to get going, although ultimately a greater production might be achieved."

Canadian Production in 1939

PRODUCTION of the 13 aircraft factories in Canada during 1939 increased in value by \$5,711,305 over the figure for 1938, the Dominion Bureau of Statistics reports. Production in 1939 was valued at \$12,638,470, compared with nearly \$7,000,000 the previous year. The figures include the value of 252 completed aircraft (\$4,177,555) manufactured in that year. Imports of aircraft and parts, with the exception of engines, were valued at \$5,550,320 during 1939, and exports were at \$439,359. Imports of aero engines and engine parts were worth \$2,192,767. The aircraft factories employed 3,596 persons during 1939, paying \$4,651,615 in salaries and wages. Of the 13 factories mentioned, seven were in Ontario, three in Quebec, two in Manitoba, and one in British Columbia. Three of the factories were engaged only in making parts or doing repairs.

130

NIGHT & DAY



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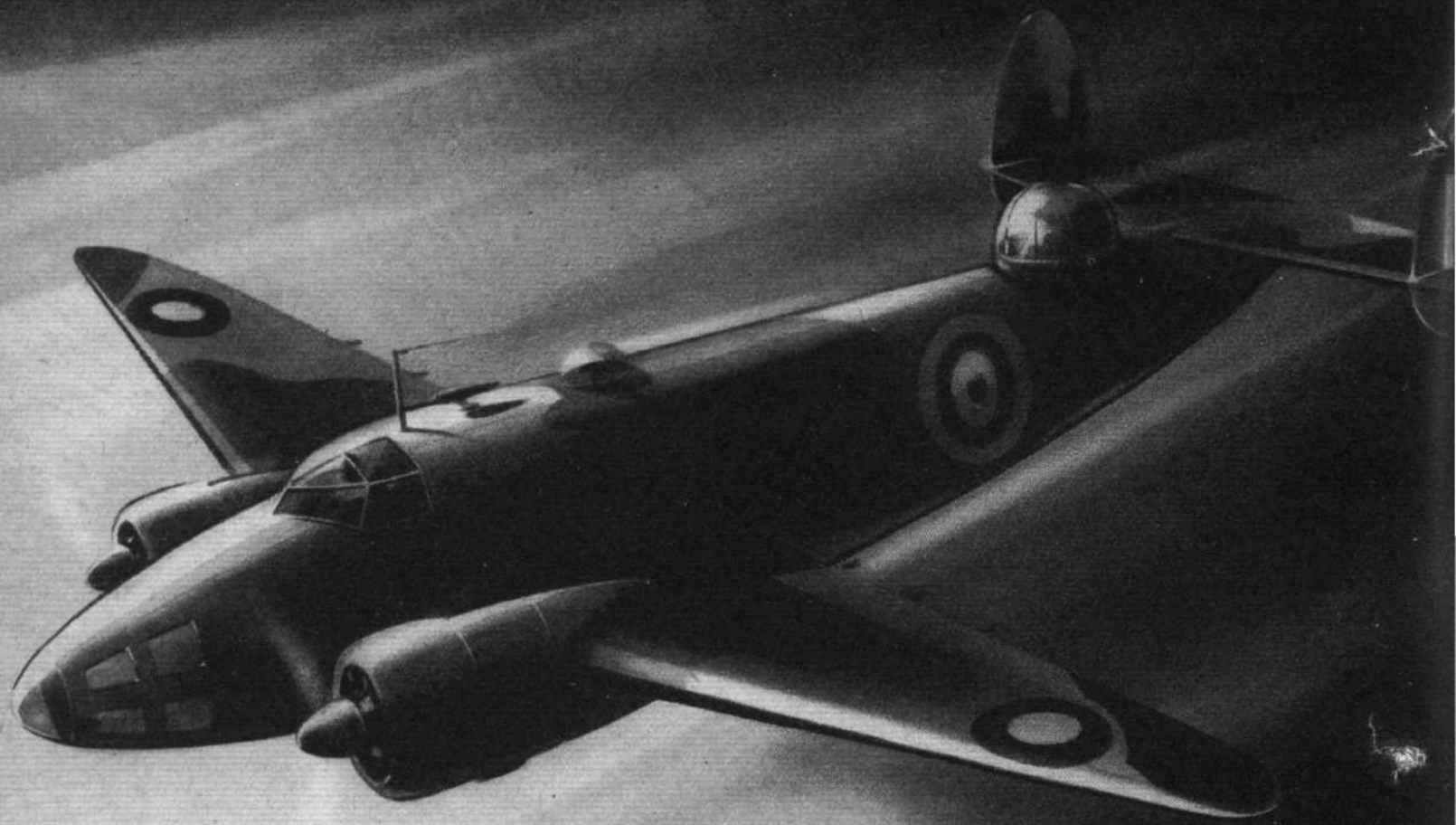
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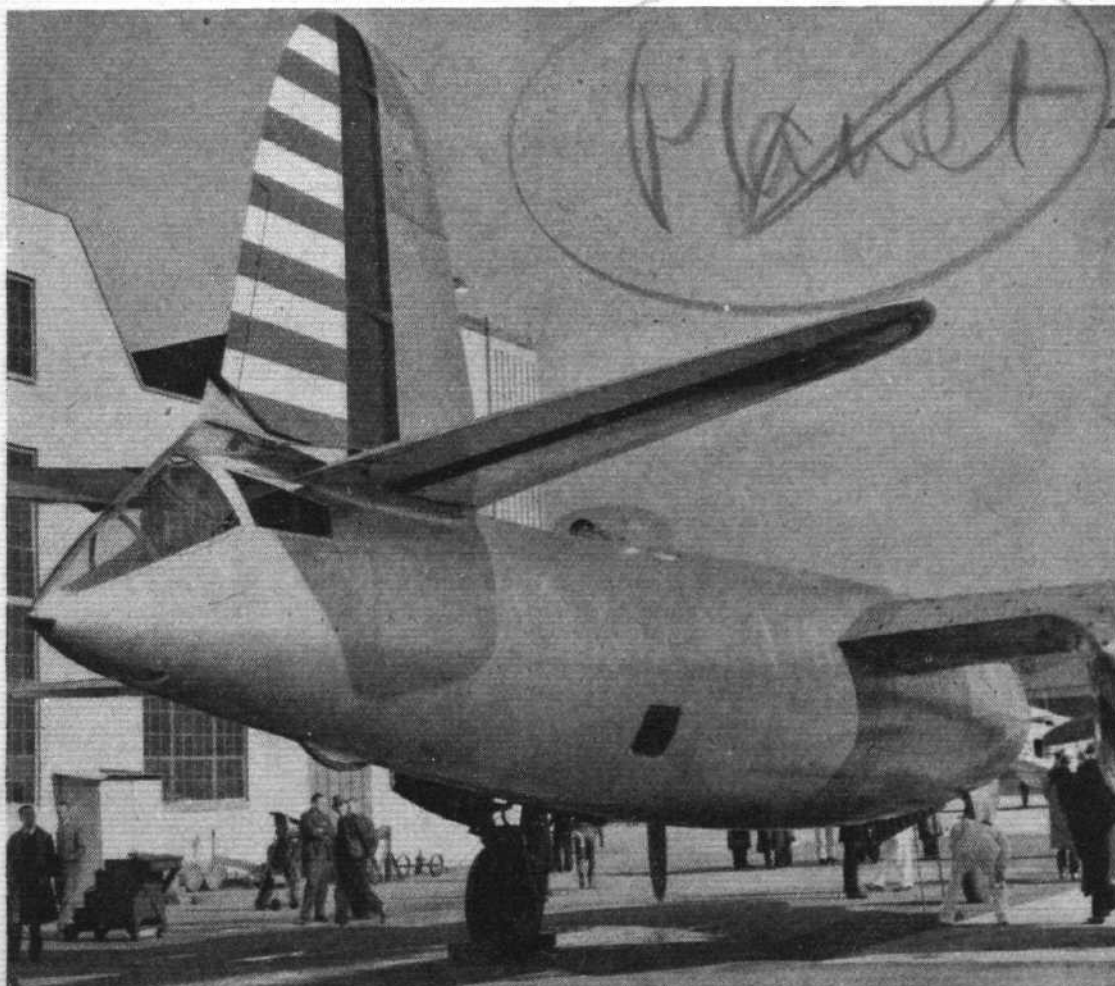
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The Martin B-26 bomber is one of the new Americans with several modern features.

NEW AMERICAN BOMBER

Efficient Fuselage Shape : Four-bladed Airscrews with Cuffs



READY for final tests at The Glenn L. Martin Company's private airport near Baltimore is the powerful Martin B-26, which is expected to prove itself a very fast bomber. This latest weapon of the U.S. Army Air Corps is a twin-engined medium bomber of high mid-wing design with a nosewheel landing gear. Powered by 18-cylinder, 1,850 h.p. Pratt and Whitney engines with four-bladed airscrews, the aeroplane has a gross weight of 26,625 lb. It will carry a normal crew of five. The machine should not be confused with the Martin 187 building

The tail position, rear turret and unfilled wing root are noticeable.

NEW AMERICAN BOMBER (Continued)

The engine nacelles project well forward of the wing, which is placed slightly above centre of fuselage

and is of a most efficient aerodynamic shape. The four-bladed airscrew is a very late development and will be of smaller diameter than a three-blader of the same power, but it will also be slightly less efficient. The drop in efficiency due to increase of number of blades may, however, be offset by the lower tip speed which the four-blader will have.

Sheet metal cuffs on the inner parts of the blades will be noticed. The function of these is to make the round part of the blades a more efficient shape and so drive more

cooling air into the engine. The three inlets on the engine cowlings are, no doubt, the oil cooler and carburettor air intakes. Cooling gills on the air outlets of the engines are on the lower halves of the cowlings so that this exit flow does not interfere with air flow over the wing.

for Britain. The company is also manufacturing another important type, the Martin PBM, a flying boat patrol bomber for the U.S. Navy.

The B-26 has several modern features worthy of comment. The moulded plastic nose is free of all structural supporting members except one horizontal one

BOOK REVIEWS

Dynamic Defence. By Capt. Liddell Hart. (Faber and Faber, 2s. 6d. net.)

IT has been charged against Capt. Liddell Hart that he has been discredited because he used to uphold the power of the defence, whereas in the present war German attacks have been successful. In this little book he combats the charge, pointing out that he had advocated "dynamic defence," and had prophesied the success of the tank used in connection with aircraft. He complains that in the British Army the possibilities of the tank have never been properly realised and developed.

Dive Bomber, by Robert A. Winston. (Harra. 3s. 6d.)

THE author of this book was an American newspaper-man and he wanted to fly. But the flying-school on Long Island wanted 18 dollars an hour and this was going to tear too big a hole in his pay-check. Then a friend pointed out that the Navy wanted pilots. The upshot of it was that he went to the Naval Reserve Aviation Base at Floyd Bennett Field, signed on the dotted line and, in due course, began his training behind a 250 h.p. Wright Whirlwind in "the sluggish, dependable old NY."

His book tells the story of his progress via the Navy's training school at Pensacola, where he learnt to handle all types of service aircraft, including the big flying-boats; to fly in formation, to make deck-landings, and dive-bombing attacks, and to navigate by night. Ultimately he was posted for active service in a fighter-squadron with the fleet on the West-coast. Finally he returns to Pensacola as an instructor with more hours to his credit than the man who gave him his first lessons and who "bawled him out" for his mistakes but who, after they had landed, always changed into a quiet, cordial, friendly soul who explained his errors and "ironed-out" most of his difficulties.

Mr. Winston has a pleasantly direct style and a sure descriptive touch whether he is dealing with some phase of life in the Navy or a near squeak in the air. Many readers will be familiar with most of the racy Americanisms which have current expression in the flying circles of that country, but for the benefit of those who might be mystified by such terms as "cutting the gun," a "flipper-turn," and a "wing-over," a very complete glossary is appended. The only point that is not explained is why the author chose the title of *Dive Bomber*, since every phase of American naval flying-training

is covered from cadet to commissioned officer, but perhaps it is to be found in his expressed opinion that dive-bombing is the most thrilling part of it all.

Production Engineering, Jig and Tool Design, by E. J. H. Jones, M.I.Prod.E. (G. Newnes, Ltd., 12s. 6d.)

MR. JONES brings to the reader of his book a most important contribution to the knowledge of modern production methods.

It is in the tool room that production really begins to fulfil (or not) the obligations imposed upon the factory by its planning department. We have seen too often the ambitions of production thwarted by the tool room; vision and imagination are not, sadly enough, part and parcel of the average tool maker. Mr. Jones has imagination, and much more than this, he has the happy knack of being able to write with this desirable quality. The reader finds in this book, not only a wealth of information and valuable hints and tips and handy ideas, but also a sound basis for building up and utilising to the full an efficient jig and tool department.

There is one point about which there may be difference of opinion. Mr. Jones considers that the tool maker should remember that the operative has brains and that the jig or tool should be such that it quickens the interest. This is not consistent with actual practice. It has been found that the more automatic the action the faster the speed of the operator. Since machine speed can neither be hastened or slackened by the operator, jig loading and picking up and putting aside can be the only operations which require attention by the worker. To have to think about these elements is to slow the floor-to-floor time, which in these days is unthinkable. The book is well worth the published price, for both student and works manager.

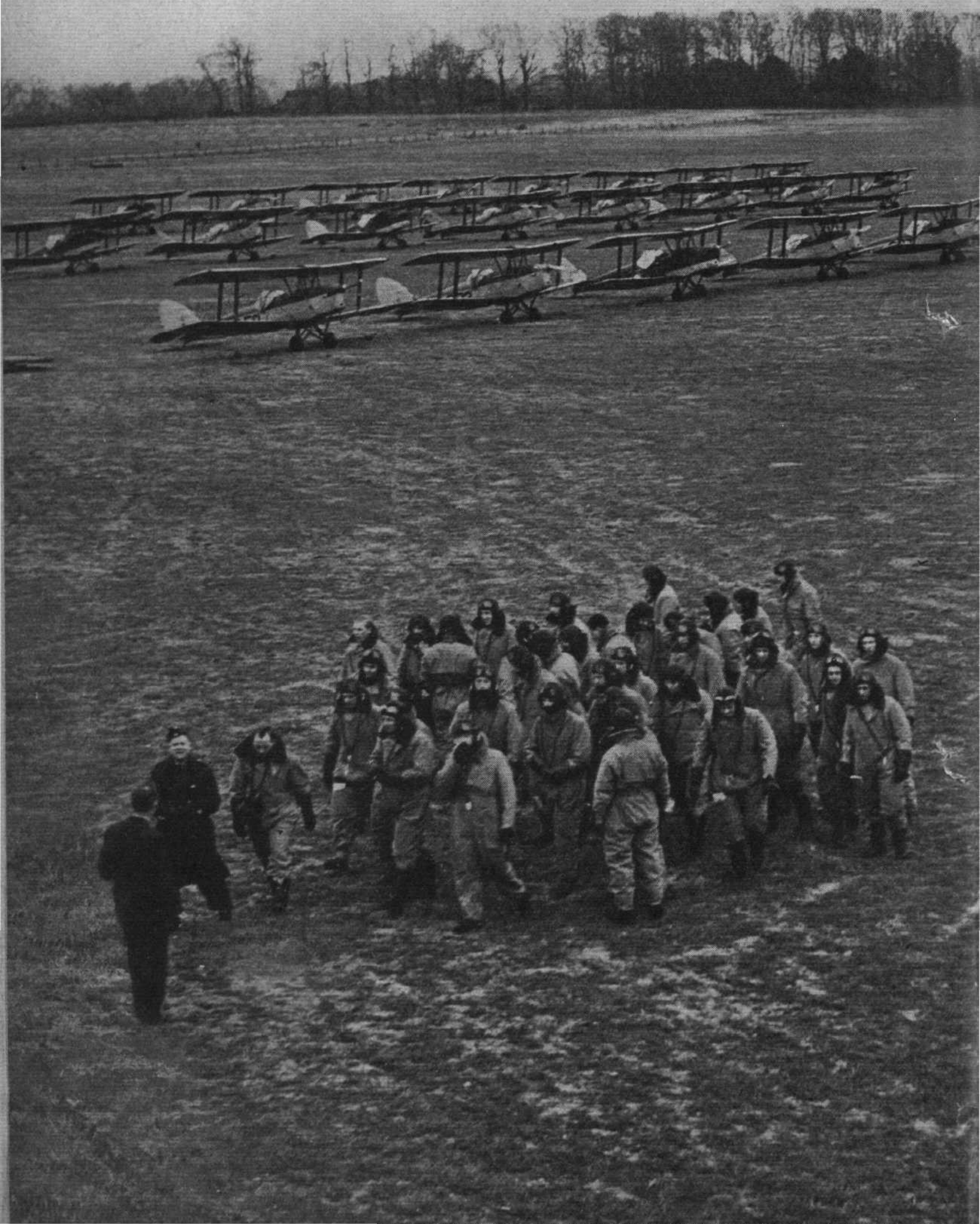
Sea Power. By T.124. (Jonathan Cape, 8s. 6d.)

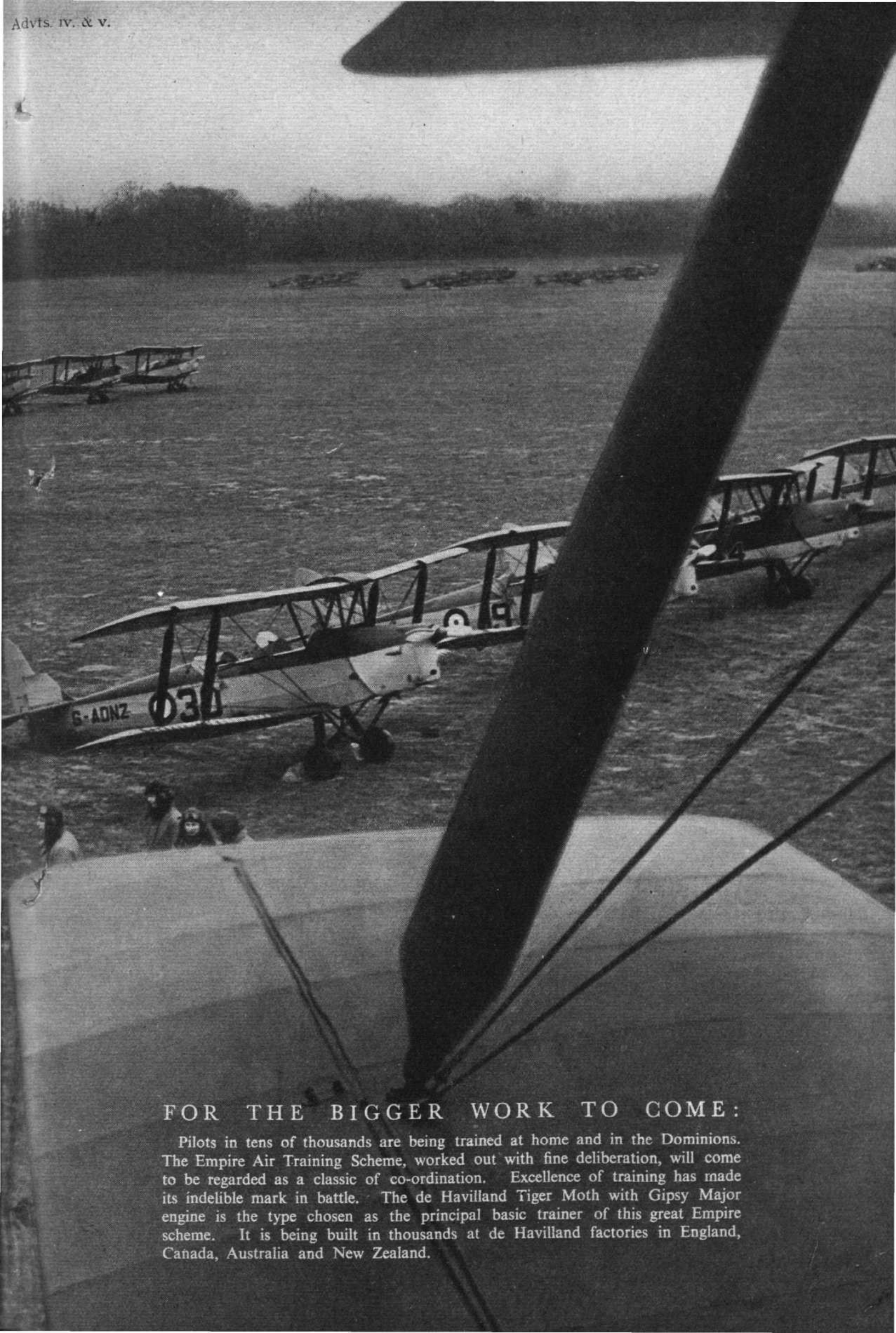
THIS author, so we are told on the jacket, is a well-known writer obliged to use a pen-name on this occasion. His views on sea-power are extremely interesting and may be the summit of wisdom, but his chapter on "The Influence of Air on Sea Power" is disappointing. He never really comes to grips with his subject. The success of the Dunkerque evacuation he attributes entirely to the Royal Navy, and overlooks the part played by the R.A.F. Fighter Command. That part was not overlooked by the Prime Minister, who said that the R.A.F. had then won "a victory."



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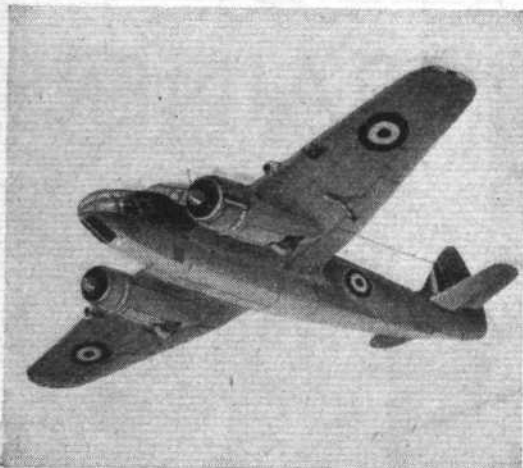
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Telegrams: "Alacast." Leeds.

FRIEND or FOE?

New Identification Series Continued : Allied and Enemy Types Compared

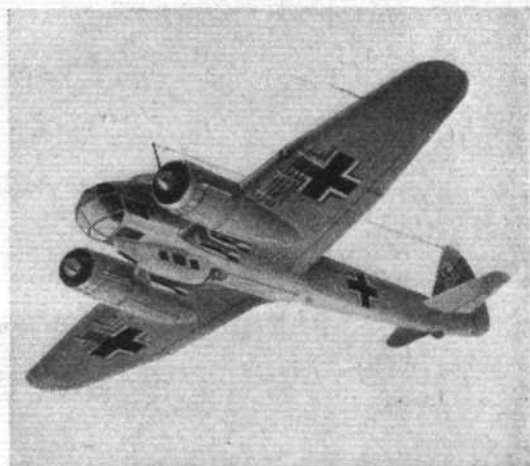
Bristol Beaufort, Twin-engined Bomber



Wheels retract into nacelles behind small-diameter engines. Deep forward part of fuselage ends amidships in gun-turret. Oil-coolers in leading-edges. Inset wing-tip lights. Single fin and rudder.

IN this, the third, article dealing with the problem of recognising hostile aircraft one of the newer types of British twin-engined machines, with which many will not yet be too familiar, is set against a German dive-bomber which superficially resembles it. Aircraft already dealt with in the two preceding articles were : Hurricane and Me 109; Spitfire and He 113.

Junkers Ju 88, Twin-engined Dive-bomber.



Wheels retract into nacelles. Circular nose radiators projecting well forward. Dive brakes below each wing. Faceted nose. Forwardly placed under-turret. Wings taper outboard of engines. Single fin and rudder.

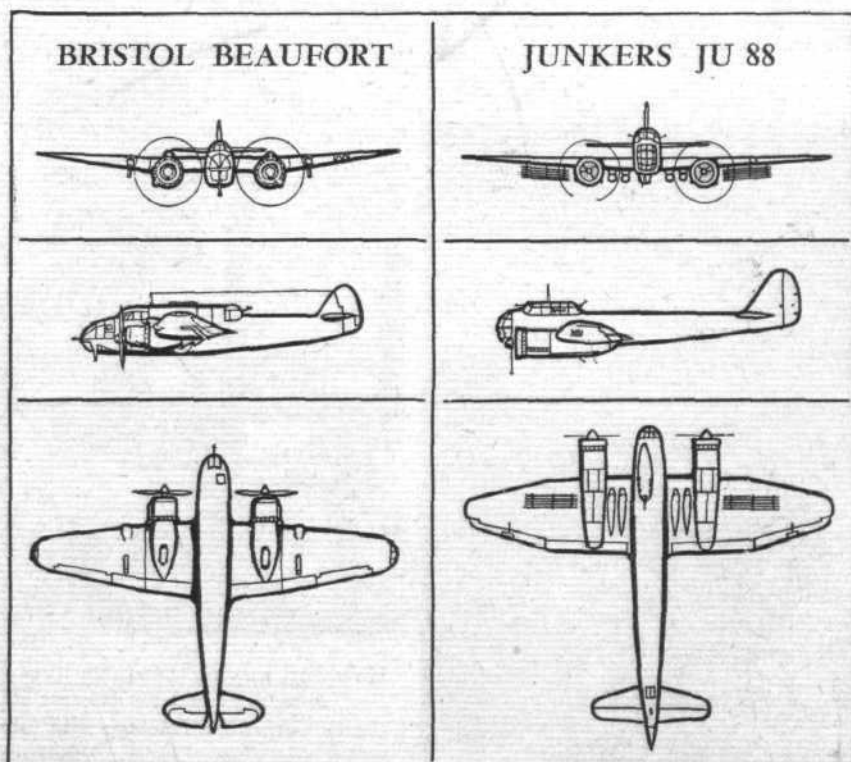
THE two machines dealt with this week are by no means "opposite numbers" in the strict sense, but they have a sufficiently close superficial resemblance, at a distance, to render confusion possible by the not too experienced spotter. The Bristol Beaufort includes torpedo-dropping among its functions and the Ju 88 is essentially a dive-bomber, so both will be mainly encountered over the sea or in coastal areas—an added reason for pairing them off in this series.

Confusion between the two machines is most likely to occur when either is seen approaching head-on, for the Junkers, although fitted with inverted Vee engines, has them enclosed within circular nacelles, which terminate in circular nose radiators, giving every appearance of radial engines similar to those of the Beaufort. This similarity is further increased by the fact that both machines have cooling gills ringing the cowlings. It should be possible, however, given reasonable visibility, to recognise the German from a fair distance by its under-turret and its faceted nose, while another if less prominent difference is the Beaufort's dihedral, which begins outboard of the engine nacelles. A sure sign—though a decidedly late one—that the approaching machine is hostile would be the lowering of the "venetian-blind" diving brakes beneath each wing of the Ju 88. At close range, also, it would probably be possible to see the externally stowed bombs carried between the engine nacelles and the fuselage. Internal bomb-stowage

is also provided, however, so the mere absence of external bombs is not a guarantee that the bird has no more eggs to lay.

But it is when presenting a side view that the Beaufort and the Ju 88 show up their differences most markedly. In the case of the former the nose of the fuselage projects well ahead of the engines, but the nose of the German is almost in line with its circular radiators. The Beaufort's nose is transparent on top, has two large "eyes" for the bombardier looking forwards and downwards, and is much slimmer than the blunt, faceted snout of the Junkers. The deeper forward portion of the Beaufort's fuselage sweeps back in a straight line from the pilot's cockpit to terminate in a gun-turret amidships, whereas the Ju 88 has an elongated gun-turret immediately above its under-turret and approximately in line with its engines.

Seen in plan, the short, streamlined engine nacelles of the British aircraft are in clearly marked contrast to the long and rather ungainly nacelles of the Nazi, which reach well back towards the trailing edge in spite of projecting so far forward. Their wing-span is also in distinct contrast, that of the Beaufort being gracefully tapered to rounded tips, each having a transparent "light" fore and aft, while that of the Junkers remains parallel to a distance well outboard of the engines, where it suddenly tapers sharply almost to a point.



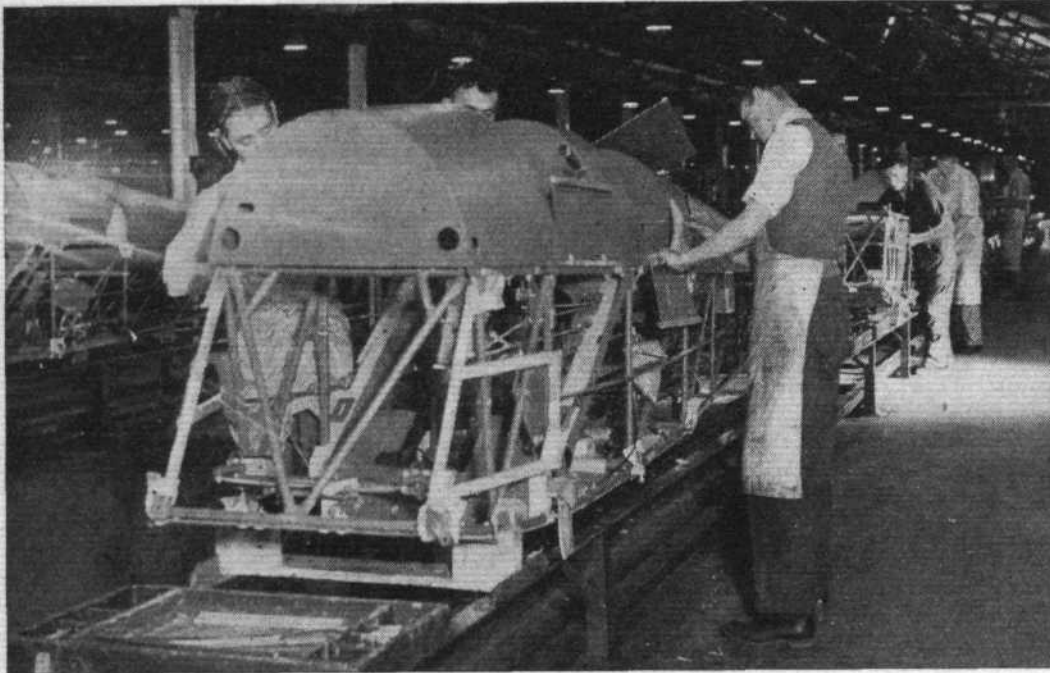
Next week : The Lysander and the H.S. 126.

TRACK ASSEMBLY OF TRAINERS

*D.H. Tiger Moths in
Quantity Production*

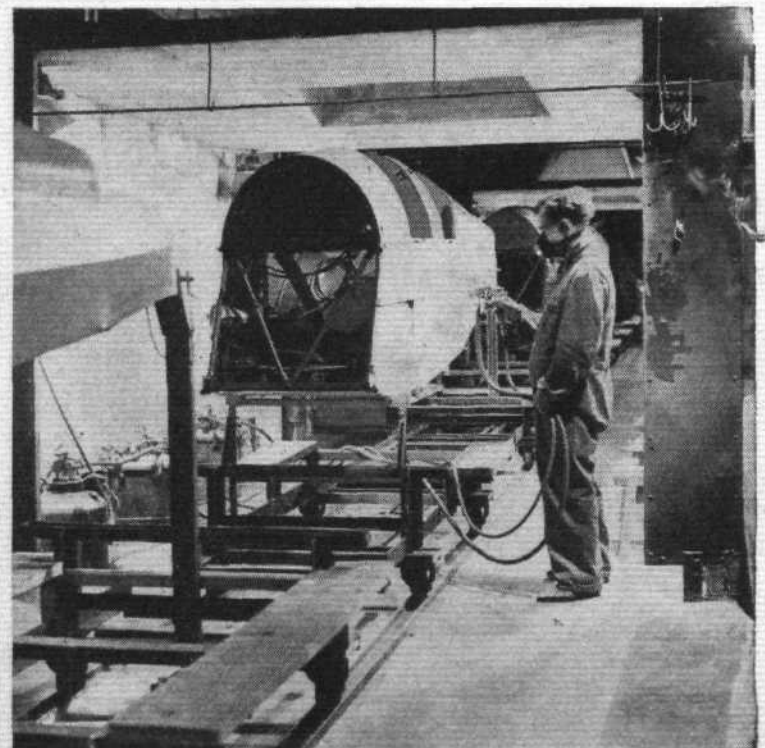
THE production of the De Havilland Tiger Moth training aircraft has naturally expanded enormously to meet the training requirements of the Royal Air Force and the Dominion and Colonial Air Forces. The Tiger Moth, which is the principal basic trainer of the Air Forces of the Empire, has for some time been made in large quantities at De Havilland factories in Australia, New Zealand and Canada as well as Great Britain.

Moving assembly lines have been used in home production since shortly after the war began, and these pictures give a few glimpses of some of the many building operations taking place on one of the fuselage assembly lines.



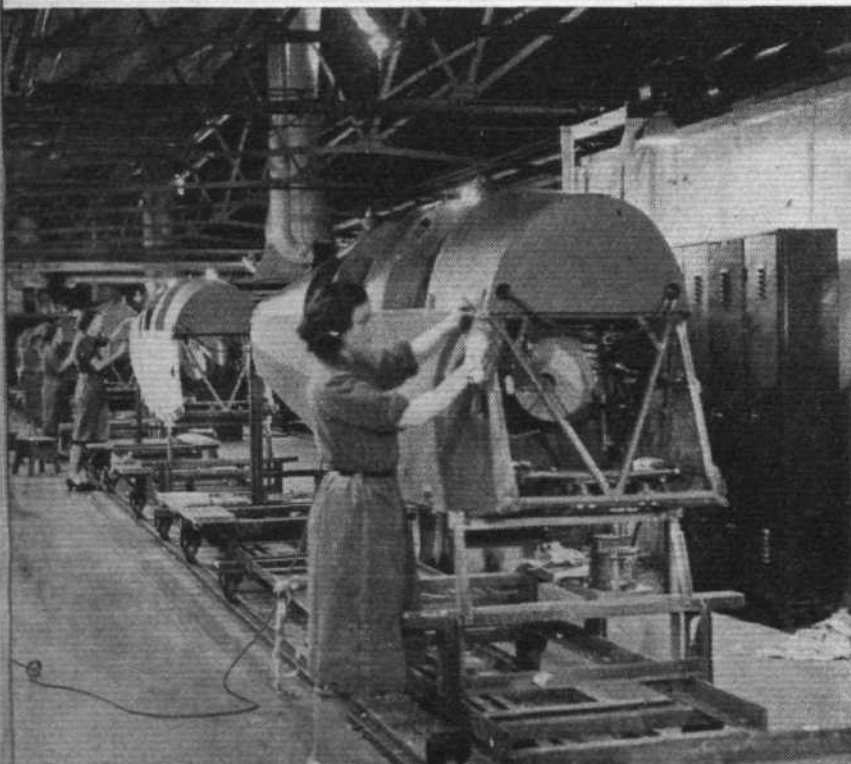
(Top) Tail surfaces, centre section struts and engine bearers being fitted.

(Centre) Building the welded metal fuselage and fitting the plywood streamline decking.



How the moving assembly line passes through the paint spraying room for exterior doping of the fuselage.

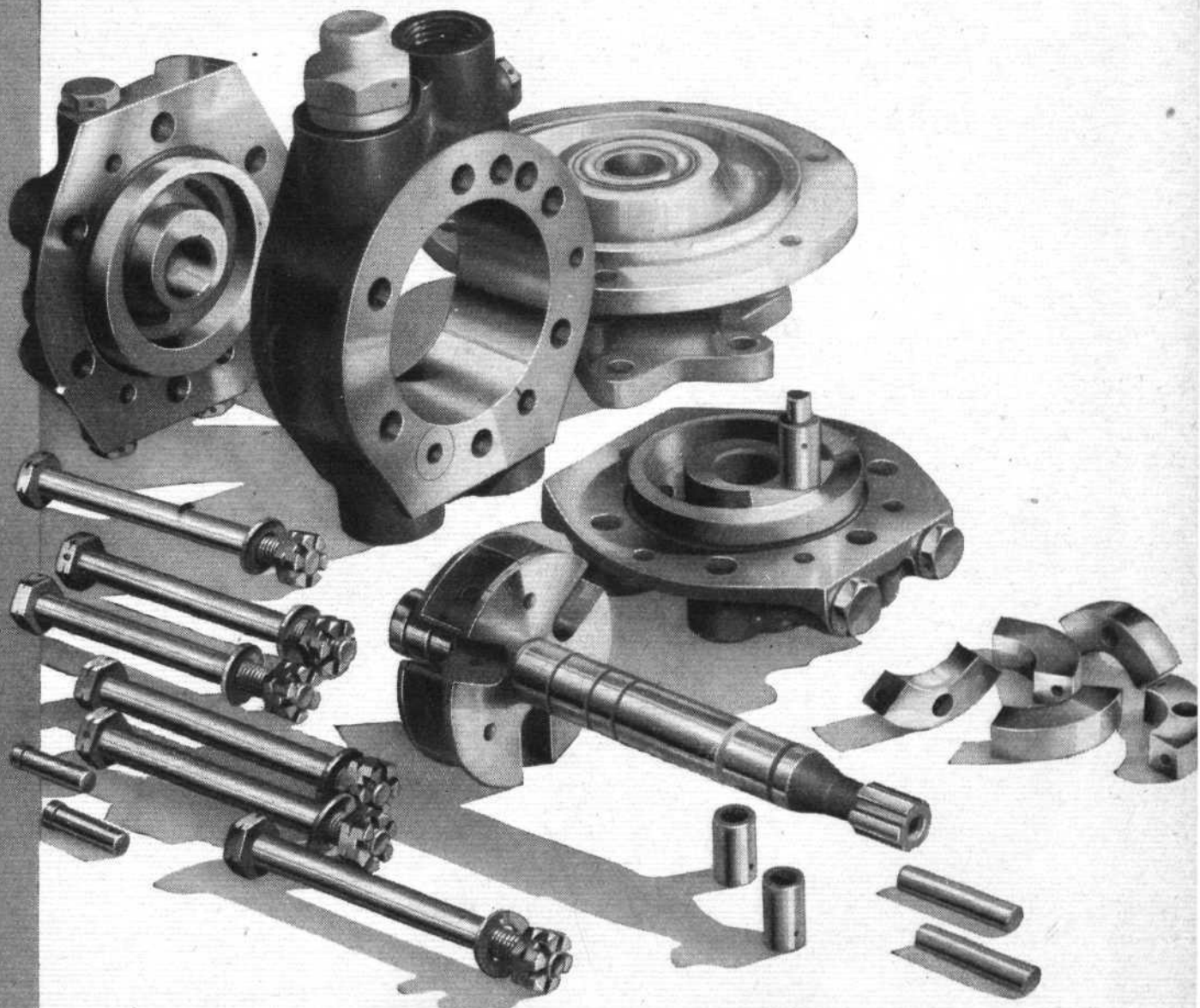
(Left) Covering a fuselage with fabric. This work is done by women.





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The Lockheed engine-driven pump



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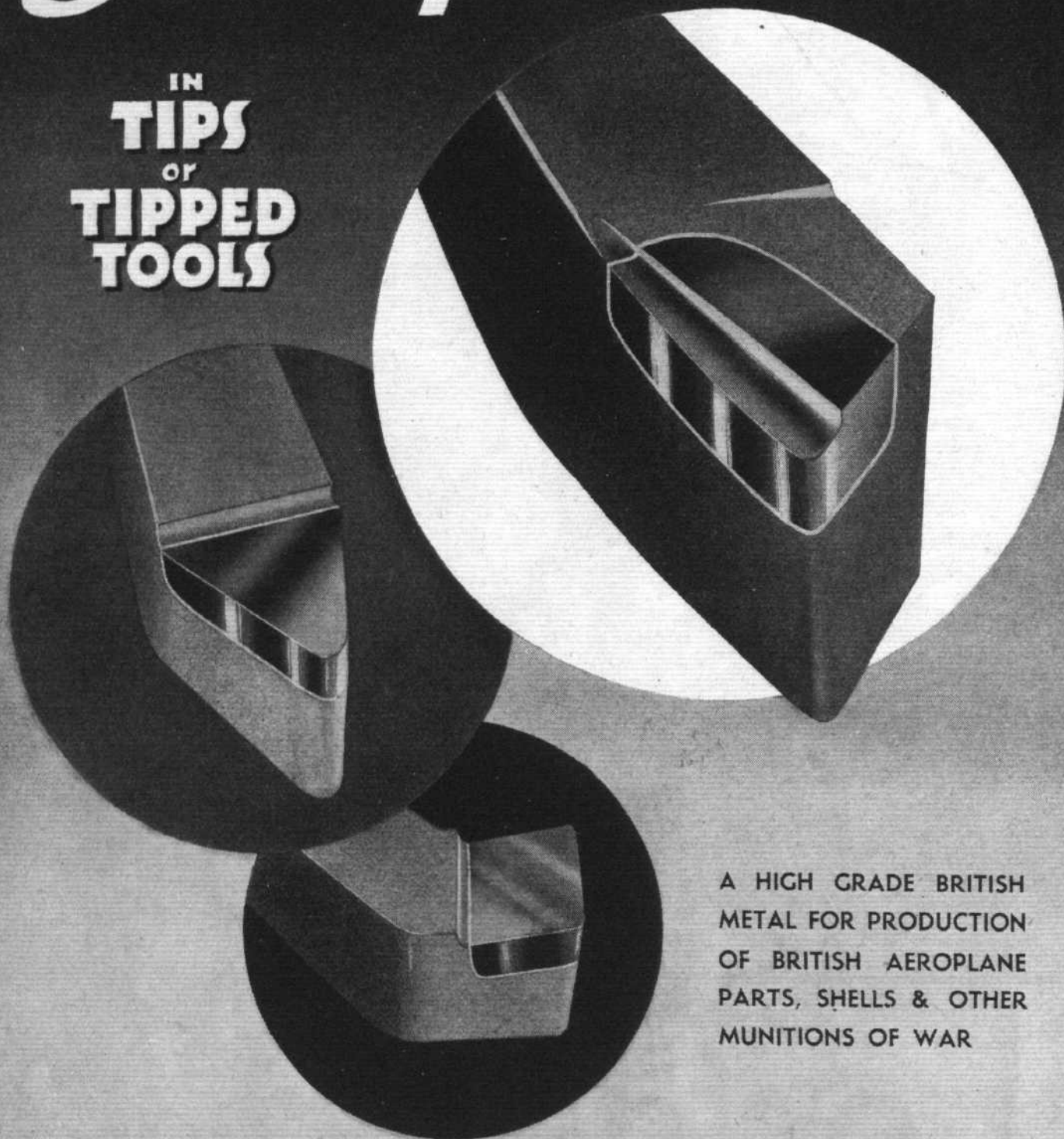
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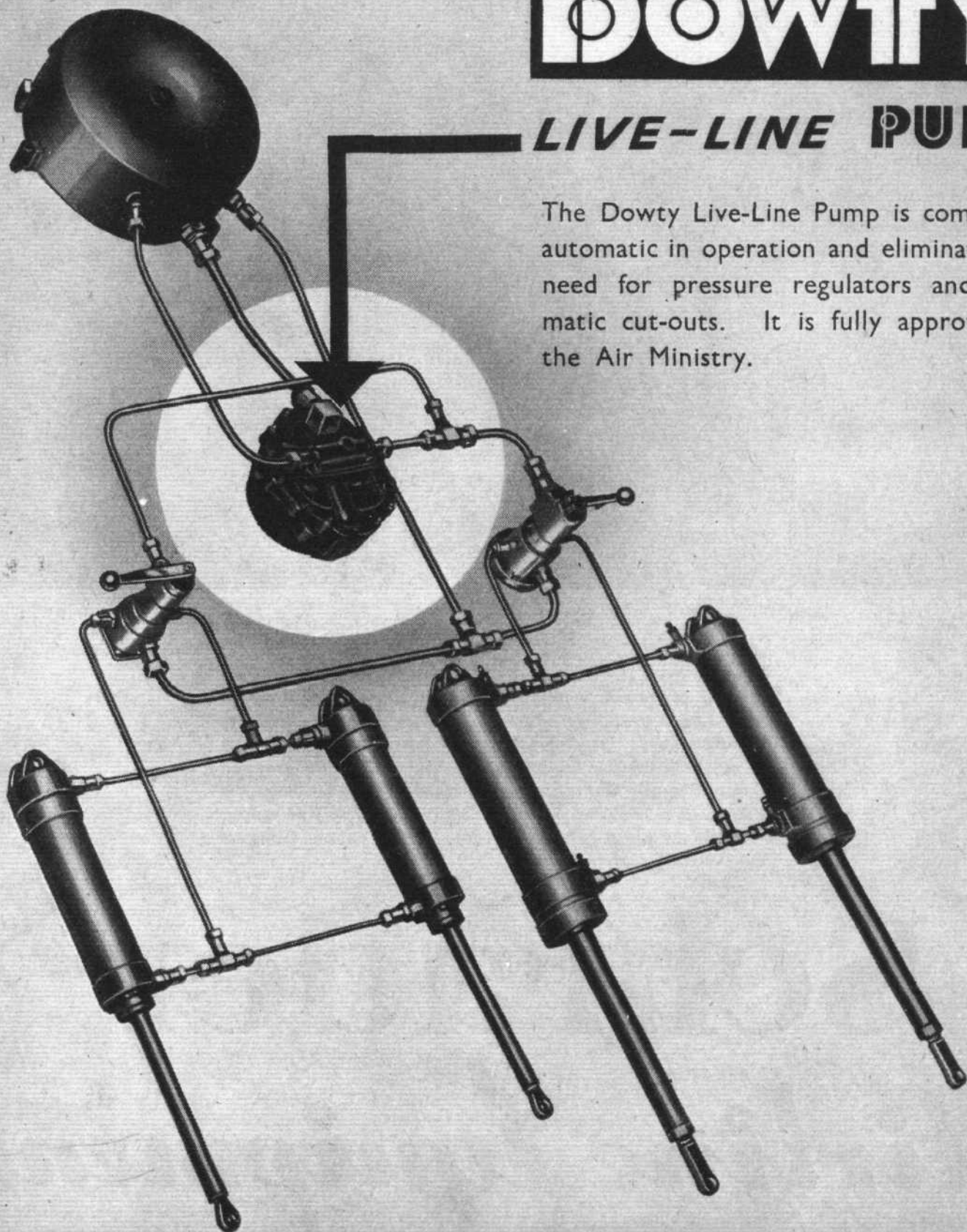
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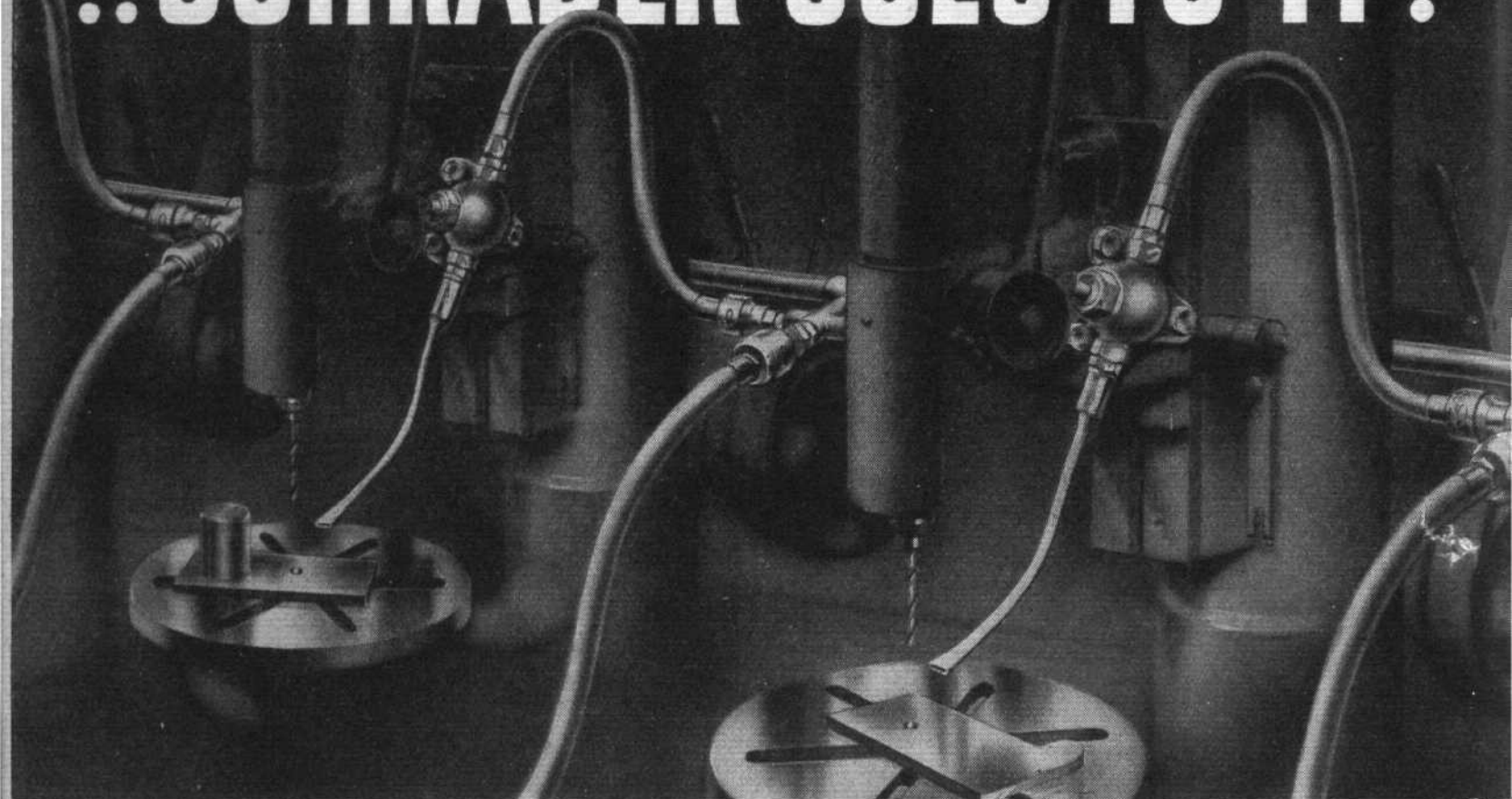
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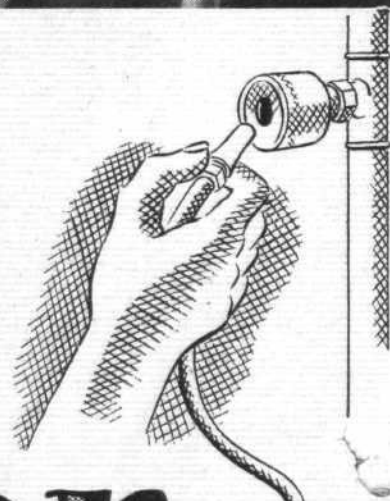
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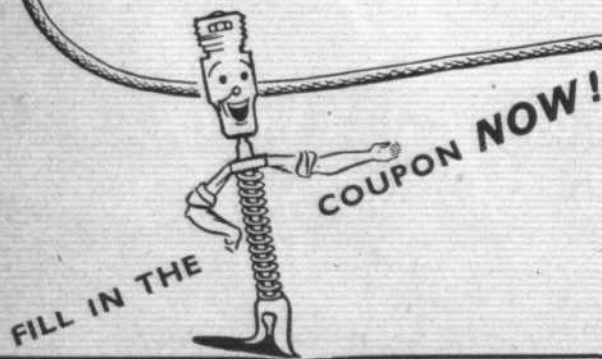
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AN ANALYSIS

Lessons of the Tactical Employment of Fighters and Bombers in the Present War

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C.

THE present war has already continued long enough, and has provided sufficient air activity in a variety of theatres of war, to make an analysis of the tactical employment of fighters and bombers of more than passing interest. We have seen resolute air defence opposed to strenuous mass air attack. We have seen air defence beaten down prior to combined attack. We have seen the air weapon employed as a defence against the air weapon, and we have seen it employed as an offensive weapon against both land and sea forces. At no time in the history of aviation has the air weapon been so widely employed, both in the geographical sense of latitude (for in this war it has been used from the equator to within the Arctic Circle) and in the tactical sense of employment in the face of the enemy.

It must, however, be understood that any analysis made at the moment is necessarily subject to several restrictions; it is not permissible, for instance, to refer to some of the close-in fighting tactics adopted by pilots to destroy enemy aircraft, nor is it possible to give details of all armament used; it is impossible to get the accurate story of actions as seen by the enemy personnel engaged, nor is it always possible to estimate fully the result of an action until after the conclusion of hostilities, when the military history of war is made public by both parties to the conflict.

Swapping Experiences

(It was not until after the Great War of 1914-18, when British and German pilots were able to meet and discuss various aspects of the air-fights in which they were mutually engaged, that things which had puzzled both at the time became obvious to each. Louis Strange refers to this in the last chapter of his book of reminiscences of the Great War.)

So there must be gaps in any analysis made at the moment which cannot be filled in until, perhaps, after the end of the war. Nevertheless, enough is left for consideration to make the essay worth while. But, because it is not possible to fill in the gaps referred to, it is necessary to treat the subject from the wider angle of "tactical employment" rather than from the sharper—and more closely guarded—angle of "employment of tactics."

It is convenient to consider the tactical employment of fighters and bombers first from the aspect of each particular period or battle of the war, for it is certain that there must be variations dictated by military necessity, latitude and the relative importance of objectives.

For this purpose I would divide the war into nine periods and consider each one separately. These nine periods are: (1) Poland; (2) Nothing to report from the Western Front; (3) Norway; (4) Low Countries and France; (5) day attack against Britain; (6) night attack against Britain; (7) Greece and Albania; (8) the Middle East defensive; (9) the Middle East offensive.

The full story of the campaign against Poland, which Germany initiated at the beginning of September, 1939, is not yet documented, but so far as the *Luftwaffe* was concerned it appears to have been a campaign in which

bombers played the predominant part, with fighters occupying a minor rôle.

Danzig was the farthest-east target on the Continent which had been attacked from bases in Britain up to the end of 1940. Poznan has also been attacked from British bases. There is little reason to doubt that some of the types of aircraft used in these attacks were available in Britain at the time of the first German onslaught on Poland. Thus the technical possibility of giving direct air aid to Poland existed in September, 1939.

No Escort Fighters

What then could have held back this assistance? In the first place there had been no operational experience in flying over the intervening belt of territory. In the second there was no possibility of escorting the bombers with fighters. At that time, it must be remembered, it had not been established that efficient fighters had the supremacy of the skies over unescorted bombers during the hours of daylight when the weather provided no cloud cover. So it is not unreasonable to assume that the impossibility of providing fighter escorts was not the reason for refraining from giving air assistance to Poland.

As a target, Poznan lay 150 miles nearer to French air bases than to bases in Britain. So, if it has been possible to bomb Poznan from Britain since the fall of Poland, it must have been possible to bomb it from France, if not from Britain, at the time of the attack on Poland.

It must, therefore, be assumed that the absence of direct air assistance to Poland was brought about by the decision of the Allied Staff that the targets were too far distant from bases in France and Britain to make any such attacks produce a decisive effect. And, secondly, that the relatively low strength of the Allied Air Arm compared with the *Luftwaffe* did not justify the employment of long-range bombers on so hazardous a task when the task could not prove a military success.

Nor was any attempt made to attack targets in Germany, although such attacks might have had the effect of reducing the weight of attack which Germany could bring to bear against Poland. The Allied Air Arm remained strictly on the defensive. Here there can be little doubt that this defensive attitude was the result of two lines of thought: one, that time was on the side of the Allies, for only time could enable them to catch up on the German preponderance of aircraft; and two, the theory that the defence was stronger than the attack was firmly established. This made it desirable for Germany to take the initiative and thus be decimated.

Owing to the geographical situation in September, 1939, it was impossible for the Allies to give direct land or sea assistance to Poland. The Air Arm was the one arm of the Services which could give any direct assistance at all. The fact that the Air Arm is considered not to be a decisive Arm against ground forces unopposed by ground forces no doubt also played a part in the decision to give no direct help.

Suppose, for a moment, that circumstances had made it possible for a different decision to be reached, how

AIR STRATEGY (Continued)

could aircraft based in France and Britain have given effective air assistance to Poland?

At that time effective staff co-operation was extremely difficult if not impossible, owing to the great belt of German territory lying between the territories of the Allies. The day was divided into about 14 hours of daylight and effective twilight, and about 10 hours of darkness. Each aircraft could have made only one return flight by day or by night, whichever period had been chosen. (If day had been selected, it might have brought disaster to the bombers.) At such a distance, without effective staff co-operation, bombers might have been despatched to attack a target, the importance of which had completely altered between the time the bombers left their base and the time they arrived over the target. They might even, in an area which had changed hands meanwhile, have bombed friend instead of foe. Without detailed information of the progress of the fighting it would have been impossible for the British staff to decide upon the suitability of targets.

There remained only one way for the Allies to take action. That was by the despatch of air units to Poland, in the same way that Britain later despatched air units to the aid of Greece on Greek territory. But the relative situations were entirely different. There was a chain of communications leading to Greece from the Middle East. There was no such chain leading to Poland, which was as isolated as had been Czecho-Slovakia the year before. So there was no way of getting the necessary ground personnel to Poland to maintain air units. The case of Poland was a classic example of the dictum that the Air Arm is tactically mobile but strategically immobile.

No doubt the German strategists calculated all the odds that were in their favour in an attack against Poland. They no doubt knew approximately what their air superiority in numbers was vis-à-vis Britain and France. They must have felt assured that neither country would attempt to send air aid to Poland to operate from Polish soil, and they therefore assumed, correctly, that the *Luftwaffe* in its tactical employment would be opposed solely by the Polish Air Force.

Outclassed

By 1939 the *Luftwaffe* was not only vastly superior to the Polish Air Force numerically, but technically its latest types of aircraft were more advanced. No doubt many of the German aircraft used in the Battle for Poland were no better than equivalent Polish machines (for example, the Henschel 123 and 126), but Messerschmitt fighters and Heinkel bombers were probably able to out-perform their Polish opposite numbers.

Thus the tactical employment of the fighters and bombers of the *Luftwaffe* in the Battle for Poland became that of an advance bludgeon for the army. The *Luftwaffe* was literally what its name proclaims it to be, an air weapon, and it was wielded to smash everything that stood in its path. It was handled like long-range artillery and a long-range machine gun corps, to create destruction and confusion so that the Polish army would be bereft of support, cities and centres of communication put out of action, civilians thrown into panic, and so bring about on a still worse scale the conditions which four years of siege war brought about in Germany in 1918. The Polish air force was overwhelmed by numbers, its aircraft factories bombed, its power of holding the air weapon at bay destroyed, and in a month it was all over, with the German army sweeping eastward until it met the Russian army coming westward.

There was no great strategic skill required for the German giant to conquer the Poles and overrun their country. The Polish railway and road communication system is not to be compared with those of the more highly developed countries which lie to the west. They were soon cluttered up with refugees fleeing they scarcely knew whither, a perfect series of ribbon targets for the *Luftwaffe*. The main cities are widely separated, and in any case they are not large by comparison with the great cities of the west of Europe. These, too, formed targets incomparably dear to the heart of the German bomber crews. There was, early in the war, nothing to stop the dive bombers. Germany had the history of her victories in Poland to recall; she took Warsaw in 1915; the Treaty of Brest Litovsk was signed in 1917. The *Luftwaffe* had not only superiority in numbers but a superiority complex as well, a dangerous combination in the personnel of an air weapon which belongs to a nation with the military history of the German races.

Eastern Training Ground

That brief campaign explained the long training which the *Luftwaffe* had undergone in the eastern half of Germany, particularly in the regions of Pomerania and East Prussia. The tactics were susceptible to careful advance preparations and planning. From above the German frontier vast tracts of Poland are visible to the eye of the individual in an aeroplane. It was easy to train both *Luftwaffe* and army for the Battle of Poland in that part of Germany which lies eastward of Berlin; easy to keep prying eyes out of that area, too. The German pilots who swooped down upon Poland must have known much of the area over which they were to operate during the first days of the short struggle. And, in the knowledge of their tremendous strength in numbers, they displayed to the world for the first time the tactics of the German air force when operating in combination with the German army against a common front. But, and this is significant, the *Luftwaffe* did not put all its cards on the table in the Battle of Poland. It retained some for later use. In Poland the strategy was of the simplest kind. Timing of the stroke and timing of the maintenance of pressure was all that was required there. As a result the tactics employed were of the simplest. Cunning was to be applied later, but not at that stage.

The German victory in Poland was followed by the curious phenomenon of the quiet winter on the Western Front. Fighter and bomber activities were restricted on both sides. Reconnaissance went on ceaselessly. Except for a few targets attacked in Germany from French bases on such a small scale as to make their effectiveness doubtful, and air fighting (also on a reduced scale) on lines similar to that of the War of 1914-1918 over the encamped armies and the territory beyond, there was no tactical engagement between the opposing air forces which possessed particular strategical merit. Both sides were marking time, the Germans because they wanted to do so, and the Allies because they thought the breathing space a heaven-sent opportunity to speed-up the output of arms and aeroplanes. And, in any case, the Allies were still acting upon the assumption that defence was stronger than attack, and that it was therefore (in all circumstances) desirable to leave the Germans to plunge headlong to their fate.

On both sides bombers were employed principally to attack targets of naval importance in Britain and Germany. Civilian targets were avoided. Defence fighters

AIR STRATEGY (Continued)

got a small amount of practice on the raiders who came in against the naval ports and anchorages. And during this preliminary period the Royal Air Force began to perceive that day bombing would not pay against a foe well armed with fighter aircraft. But although that principle was yet to be fully established, the lesson was duly noted.

Aircraft were tactically employed to lay mines in coastal waters. The Germans began the practice. Soon Royal Air Force aircraft were converted to carry out the same duty. These two were the only lessons learned regarding the tactical employment of aircraft during the second phase of the war.

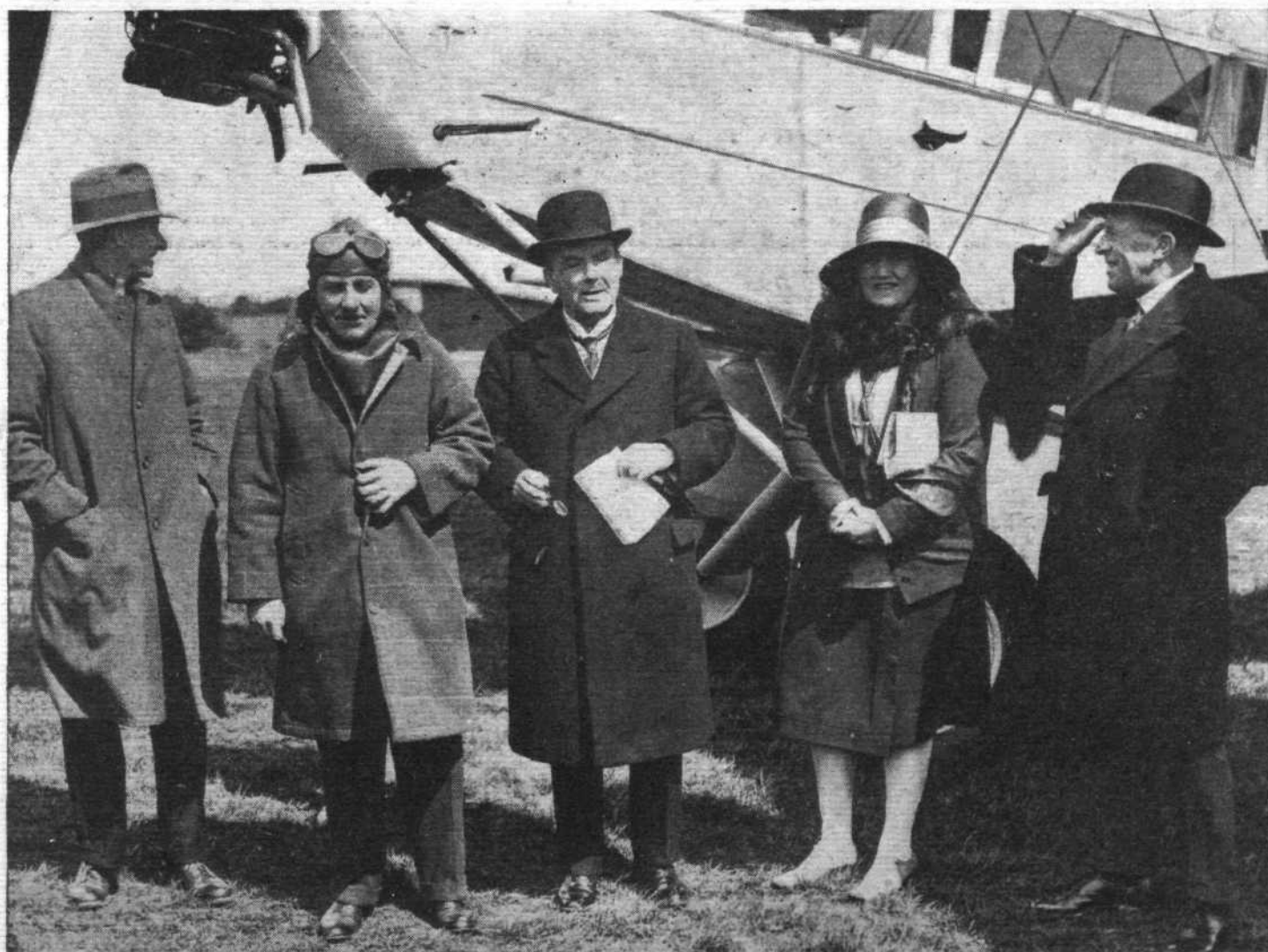
(Next week: Norway—New Tactics Employed.)

DEATH OF LORD WAKEFIELD

WITH much regret we record the death of Viscount Wakefield. He died on January 15 at Beaconsfield, in Buckinghamshire, three days after his eighty-second birthday. He was a large-hearted philanthropist whose generosity was felt in very many different directions; but the development of civil flying was, perhaps, nearer to his heart than any other interest, and he much appreciated the nickname given to him of "The Patron Saint of Aviation." From the earliest days of flying he became convinced of its important future, and he did all that he could to help it on its way. His money made possible the Australian and South African flights of Sir Alan Cobham, the Australian flight of Miss Amy Johnson, and the first flight from

Australia to England of Mr. Mollison. In addition he provided Wakefield scholarships for R.A.F. cadets at Cranwell, and as vice-president of the Institution of Aeronautical Engineers he presented an annual gold medal for the designer of the best invention which increased safety in flight.

In 1899 he founded the firm of C. C. Wakefield and Co., Ltd., and it was appropriate that Castrol and the other products of his firm should have given valuable help of another description to many aircraft flights. In 1915-16 Sir Charles Cheers Wakefield was Lord Mayor of London. He was created a Baron in 1930 and a Viscount in 1934. He leaves no heir, and the peerage becomes extinct.



A WAKEFIELD MEMORY. Standing in front of the aeroplane "Youth of Britain," on which Sir Alan Cobham toured the country in 1929, are, left to right, Capt. G. de Havilland, Sir Alan Cobham, Lord Wakefield, Lady Cobham and Sir Sefton Brancker.

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.

THE OBSERVER CORPS Dilly and Dally Resurrected?

I HAPPENED to pick up a copy of your paper recently and noticed what I consider a very timely article written, presumably, by a member of the Observer Corps.

This article voices the almost unanimous feelings of the Observer Corps over a very large area, if not the whole country.

Surely, after all these months and all the lessons we should have learnt, the present condition of this corps would make one believe that our old friends, Dilly and Dally, were by no means extinct.

"CANADIAN SCOT."

THE SLIP-WING BOMBER Problems of Production

WITH reference to Mr. Pemberton-Billing's slip-wing bomber, I am rather surprised that so far none of your correspondents has raised the obvious objection of production time.

Granted that the machine would do everything claimed for it, what would have happened if the Air Ministry had said: "Go ahead with it" in the early part of 1939?

Well, "P.-B." at least ought to know. First, find a factory and then equip it. The skilled staff required would have to be either conjured out of a top hat or poached from other factories. The same remarks apply to aircraft parts, materials, and accessories.

Now at least one year would have gone by the time that "P.-B." was ready to start, and, having started production, I estimate that five years would elapse before the slip-wing bombers would be produced in squadron numbers.

The Vickers Wellington (B 9/32) took six years to get moving in any quantities worth having; a more recent bomber will take a total of four years from the time that the design was finally settled.

So that, starting from scratch, the slip-wing design would hardly have been ready before 1945 as a practical proposition. The views of the designer would be of very great interest in this connection because of his previous experience of production.

JOHN V. HEWES.

SUB-CONTRACT DRAWINGS Connecting Link Wanted

THIS correspondence has covered a lot of ground since its starting point. The fundamental which emerges is that all correspondents seem agreed that production problems need tackling pretty seriously; where they differ is about who should do the tackling!

Logically, there are two lines of approach: (a) from the designer's end; and (b) from the sub-contractor's. If you start from (a) you postulate a designer or production engineer who is *au fait* with the whole production position throughout industry—remembering that as his particular sub-contractors have probably still to be settled, personal contact on doubtful points is impossible at this stage. The constant comparison with the motor industry seems rather unfair in this connection, in that the motor designer has long experience of design for mass production behind him; also, he has got most stages of production "under the same roof," which, under the sub-contract system, the aircraft designer has not.

Starting from (b) presents the individual sub-contractor with a *fait accompli* to turn out in large numbers as best he can, at a stage when, as "Observer" points out, any change to facilitate production is bound to be wasteful in one way or another. Hence my original suggestion that he should be given the closest possible co-operation in the matter of drawings and information—for which I was rather roughly handled by another correspondent!

Somewhere between these two extremes lies a method that would enable the designer to get what he wants, and the sub-contractor to give it to him without extra difficulties.

When in doubt as to how to do a lot of big things, it is instructive to think how one would do a few small ones. So how does a small productive business tackle a comparable problem? In my own, for instance, 75 per cent. or more of

all work comes in by post with perfectly clear instructions, and goes out the same way; there you parallel the straight-forward sub-contract jobs which give no trouble and go through as simple routine. The other 25 per cent. raise some "snag"; here I come on the picture, find out that the customer wants so-and-so drawn in such-and-such a way (Stage 1), and then come back to my drawing office and fight out with the draughtsman how it can be done (Stage 2). Without taking any practical hand at either end, one can speed and simplify production purely as a "communication line," and by knowing what each side wants to do and what they are up against in doing it.

If the customer represents the designer and the draughtsman the contractor, here is quite a good analogy to a sub-contract job. Doesn't the weakness about which so many correspondents complain boil down to the fact that production to-day is practically all Stage 1 and very little Stage 2? (If the mass production enthusiasts were given their heads at the designer's expense, we should reverse the order probably with no better results.) And isn't what is lacking in our parallel some connecting link between design as a whole and sub-contract as a whole? Granted that individual contact can do much, and is essential at many stages, something bigger is needed to enable the average designer to turn out every time a drawing that won't present headaches to any average sub-contractor.

Many of us think the "something" should have been an industrial census, at the beginning of the war or even before; but that is hardly relevant to the present argument. The alternative is some semi-official body set up by the industries for their own convenience. It wouldn't issue regulations or clog the wheels in any way; it would be advisory and informative to the utmost degree. For instance, if approached by the design end on some doubtful point it would say "if you make this hole that size, there are a few firms who can start production at once—if they aren't doing something else; if you want bigger production, alter your dimension by so much and you can take your pick from a hundred firms with the tools to do the job." This is an elementary example, but will serve to show what I mean.

It wants a mass of information up its sleeve, and a practical staff who know what they are talking about to interpret the facts. Given the real co-operation of the firms concerned, anyone who has had any practical experience of collating information on a big scale will agree with me that it could be done, and done very usefully indeed.

Possibly the S.B.A.C. and the Ministry of Aircraft Production are already doing most of this job. If not, they—together with a representative body from the motor trade—seem the people to forge such a "connecting link." And with respect to all the varied opinions that have been expressed in this correspondence, I still think it would be worth the effort.

GAVIN STAREY.

DESIGNING FOR PRODUCTION Call In Steel Body Designers

AS a contribution to your controversy regarding "Designing for Production," I, as a newcomer to the aircraft industry, would like to mention a few of my impressions.

First, the needless number of parts often used where two or three would do if properly designed. Why not more flanging of webs in place of angles riveted on everywhere? Nose ribs in particular suffer from this complaint.

Why do not aircraft designers realise that by the time all these parts have been tooled up and jigged up, the cost is much in excess of the cost of two or three slightly larger tools? Besides this consideration the production costs might be down to as low as 20 per cent. of the Heath Robinson design which the poor manufacturers are trying to mass produce these days.

Secondly, I endorse "Six-year Apprentice's" remark about the accuracy of drawings. More than half the queries arising in aircraft production appear to trace back to nothing more than carelessness in drawing preparation and checking.

Lastly, the lack of allowance made for production variations of sheet-metal parts is lamentable. The draughtsman who thinks that large sheet-metal parts can be constantly made to



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CORRESPONDENCE (Continued)

± 0.010 should have a shot at doing it. This degree of accuracy is often insisted on by A.I.D., etc., in places where ± 0.062 would be quite in order. This lack of discretion is often the cause of thousands of pounds worth of scrap, and should not be allowed when we are fighting for our lives.

I should say that a good steel automobile body designer at hand during the designing of an all-metal aeroplane could probably reduce the production time per machine by anything up to 25 per cent.

"BODY D.O."

SUBMERGED ENGINES

Some Difficulties Outlined

FOR some considerable time, there have been references and announcements in the leading aviation journals on the subject of submerged engine installations. Just what are the possibilities of the submerged installation?

I have read extravagant claims of enormous gains in speed and range made possible by submerging the engines of bomber and other aircraft. A good many of these installations seem to be almost incredibly crude. Almost invariably the thickness/chord ratio goes up, sometimes to as much as .25, an absurdly high figure.

When we realise that wing loadings are going up, that power loadings are coming down, that thickness/chord ratios are becoming lower, wings are getting thinner, we see that the wing-submerged engine at any rate is fighting a losing battle. Practically every bomber now in service could be re-designed to take suitable flat engines, but with the newest designs having speeds of around 400 m.p.h. the picture isn't so good. For one thing, the 24-cylinder engine is now well in the picture with powers from 2,000 to more than 3,000 b.h.p., with the result that the Flat-12- and 16-cylinder engines are hardly powerful enough.

With the disappearance of the engine nacelle, the retraction of the undercarriage becomes difficult; with the engines in the wing, wing retraction is virtually impossible. There is, of course, the amphibian type of retraction gear with retraction into the fuselage; but for the very high speeds that are now visualised there will be a further reduction in the width of the fuselage, and the already narrow track of this gear will become even narrower with a dangerous lack of stability on the ground. This type of undercarriage also possesses the disadvantage of getting in the way of the bomb racks.

In the "Aircraft Engineer" supplement to "Flight" of Dec. 26th there is shown a pusher aircraft (Fig. 4, page 41) in which the rather narrow-track undercarriage is retracted into a small variable-incidence wing. Mr. Burn's wing-mounted engine installation depicts a wing having a depth of 60 in. at point of installation. The maximum depth available with an engine of 2,100 b.h.p. at this point, assuming 2 engines and a speed of 400 m.p.h., is, in fact, only 24 in.

The engine strikes one as being unduly far aft in the wing. There is a mass movement aft of more than 3 tons in the aircraft indicated in Fig. 4. This aircraft would need several tons of ballast in the nose to bring any weight on to the nose wheel. Time and again I see general arrangement drawings of pusher aircraft that could not hope to fly. In the pusher "Airacuda" fighter, the engines are well forward. Not only this, but 2 air gunners, 2 37 mm. cannons, ammunition added to the weight of the emplacements compensate for the weight of the airscrew aft of the trailing edge.

The submerged engine needs to develop in excess of 1,000 b.h.p. per ft. of depth to beat the best external installation, which is about half the depth of the present opposed engines.

Wing-root installations permit of somewhat thinner wings, due to the greater depth available. In these installations, the engine auxiliaries may "overflow" into the fuselage where there is generally unlimited depth, and accessibility in flight is very good. The crankshaft being at right angles to the line of flight entails the use of a bevel reduction gear, and as the engines face in opposite directions, there is the advantage that they turn in opposite directions naturally. There is at least one 24-cylinder engine that could be root mounted within the Davis aerofoil of the Consolidated 31 flying boat with powers 50 per cent. greater than the present installation. The power per foot of root depth exceeds 1,000 b.h.p.

One might summarise the position as leaving something in hand only in flying boats with a wing loading not exceeding 50 lb./sq. ft. and a power loading not less than 9 lb./b.h.p. The problem of wing-tip float retraction or beaching gear retraction would not be affected by this installation. With the 24-cylinder engine already mentioned, the accessibility is very good, the mounting weight is very low, complete engine

replacement can be effected very quickly, and the transmission efficiency is reasonably high, about 96 per cent.

In the British Aircraft Number of "Flight," that eminent designer, Mr. Sydney Camm, has indicated his preference for the fuselage-submerged engine installation thus:—"The installation weight will, of course, be seriously increased, but this is the price we must pay for increased speed." Not only is the weight seriously increased, but the transmission efficiency also falls away to an alarming extent due to the 2 right-angle drives per engine and the considerable shaft length.

A bomber the size of the "Wellington" would require the following:—

- (1) 2 engine bevel pinions.
- (2) 2 engine bevel wheels.
- (3) 2 primary shafts 10 ft. long.
- (4) 2 outboard primary shaft bevel wheels.
- (5) 2 secondary shaft bevel wheels.
- (6) 2 secondary shafts 10 ft. long.

To this conglomeration, we must add the weight of 3 bevel casings, possibly 4 torsional vibration dampers, 2 reinforced casings to carry the propellers and resist gyroscopic and thrust moments. The amount of power absorbed in the above transmission may well total 500 b.h.p. in a 5,000 b.h.p. installation.

Since the only justification for fuselage engines is, as Mr. Camm states, that of increased speeds, we are automatically led to ask yet another question: how fast will a medium bomber go with the most advanced possible external installation developing 400 b.h.p./sq. ft. of streamlined frontal area? Assuming that a speed of 480 m.p.h. is a reasonable expectation, the fuselage-mounted installation must be capable of providing a speed of not less than 500 m.p.h. In such a bomber, the undercarriage and 2 engines totalling not less than 5,500 b.h.p. have to be accommodated within a small fuselage in addition to crew, bomb load, equipment, etc. Is it any wonder that Mr. Noel Pemberton-Billing has been advised against the fuselage mounting?

Despite the monumental nature of the problems involved, the writer believes that it would be a mistake to reject the twin-engined pusher aircraft altogether. A 48-cylinder engine can be designed that does not take up an impossible amount of space, it can be placed well forward in the fuselage, the main landing wheels will retract aft of the engine, 2 1,000 lb. bombs can just about be persuaded into the bottom of the fuselage by one experienced in the packing of sardines, a crew of 3 not interested in *lebensraum* might be coerced into the nose section forward of the colossal supercharger and cooling element. One thing is certain, the crew would never complain of the cold.

What are the chances of hitting military objectives at 500 m.p.h.? It is obvious that the load will have to be released a long way from the target area with a consequent reduction in accuracy. On the other hand, if the pilot slows down to 200 m.p.h. in a daylight attack, he will find himself at the mercy of enemy fighters and/or ground defences.

Before this war is finished, I believe that both sides will be using fighter bombers mounting 2 24-cylinder engines and capable of holding their own with the fastest single-engined fighters. I very much doubt whether there will be time to develop the pusher with fuselage-mounted power plant.

Wishing "Flight" all the best in 1941.

JOHN W. MORRISON.

PRESSURE CABINS

Initiative of British Designers

MR. J. R. FINNIMORE has made some graceful and generous references to the initiative shown by General Aircraft Ltd. in practical development, and we are grateful to him for his recognition of what we have done and his kindness in drawing public attention, once again, to our pioneering work.

For the benefit of my old friend, Pemberton-Billing, and your readers may I correct his statement that our pressure cabin experiments "possibly did little more than copy the Americans." I am indebted to Mr. Finnimore for having drawn my notice to this mis-statement.

The pressure cabin aircraft designed and built by my company attacks the problem of stratosphere flying from a point of view quite different from the accepted American standpoint, as far as I know.

We believe that the two and a half years of flying experience we have already had with our machine has been the means of our getting together a great amount of really valuable data. We are daily finding out more and so carrying on further development work of an independent nature.

Our experience to date confirms our view that, to master any

CORRESPONDENCE (Continued)

radical problem in aircraft design, flying experience over a long period is essential.

I should be sorry if my letter was construed as an expression of objection to being told that we "copy the Americans." There are many cases where our industry could, and should, draw on their work, just as they do on ours when the occasion merits it.

Where I do feel the American industry does show up to advantage is in its quicker appreciation as to which of those ideas and developments always being brought forward should be commercialised first.

It is seldom the fault of designers and engineers in this country that the Americans are a jump ahead of us; the responsibility rests with the commercial control.

E. C. GORDON ENGLAND.

GROUND ENGINEER'S EXAMINATIONS

Written Papers Advocated

IT is suggested in the article by Mr. Thomas on the above subject that the tendency is increasing to regard the ground engineer's licence as a certificate of competence, and as most ground engineers will be called upon to rectify faults themselves, or at least should be able to do so, this tendency appears to be logical and desirable.

The chief disadvantage of the present examination is its verbal character, which operates harshly against a man of somewhat nervous temperament, who is unable to do himself justice through examination "nerves."

It would appear desirable to include a written paper to offset this tendency, and assess the results on both written and verbal answers.

In addition to this, the oral part of the examination could be combined with simple practical tests, such as fitting, hard and soft soldering, or welding, use of measuring instruments, retiming of valves and ignition, inspection of carburettors and fuel pumps, including flow test, general methods of inspecting and testing, and simple fault-finding, etc.

This is relatively simple to arrange for the engine licences, but presents a difficulty for aircraft on the score of the space

required, and multiplicity of types. It should be possible, however, for simple rigging operations to be carried out, and such things as the importance of locking devices indicated to ensure that the prospective ground engineer has a sound grasp of the fundamentals.

A similar system has been carried out for the automobile industry, in the form of the I.A.E. repair certificate scheme, which is issued as a certificate of competence, and it is interesting to note the number of experienced mechanics who are unable to pass a comprehensive test of this nature at the first attempt. Senior members of the Institution have volunteered to act as examiners, and equipment has been loaned by interested firms.

There may be difficulties in the way of operating a similar scheme for the ground engineers' licences, but there is no doubt that it weeds out the incompetent.

The suggestion that the ground engineer should carry a "discharge" book is very sound, as it forms a career record of considerable value to a prospective employer.

G. D. DUGUID.

Suggested Changes Approved

THE article in your issue of Dec. 19, by the secretary of the Air Registration Board, dealing with the examination of ground engineers, surely makes very interesting reading for all concerned; being, as it is, the first official indication that a very long-felt need for drastic change in this matter is at last likely to materialise.

It is well known that there are very many men who gain the possession of a ground engineer's licence purely with a view to using it as a proof of their ability as engineers, and, perhaps, rarely have occasion to use it for the purpose for which it is intended; particularly is this so when the licence holder is employed by a large concern having its own approved inspection department. To such men as these the scheme put forward by the secretary of the A.R.B. should have instant appeal.

I may add that the foregoing remarks apply mainly to air line operation.

East Croydon.

H. W. HOLMES.

ATLANTIC AIR FERRY

American Bombers are Flown Here : Shipping Space Saved : New Unofficial West-East Record?

IT is no longer officially regarded as "on the secret list" that for some little time American bombers built for the R.A.F. have been flown across the Atlantic to this country. Such a course was the natural corollary to a steadily increasing rate of production, and it was largely a matter of making the necessary arrangements in the matter of available pilots to undertake this special duty.

At present four types are being brought over under their own power. They are the Lockheed Hudson long-range reconnaissance-bomber, the four-engined Boeing B-17 (popularly known as the Flying Fortress), the Lockheed Vega Ventura, which is really a bigger and faster version of the Hudson, and the Consolidated 28-5 twin-engined flying-boat. Eventually other types which can be given sufficient range by the temporary addition of extra fuel-tanks will also be ferried across the ocean, including the four-engined Consolidated (land-plane) bomber.

Contrary to popular belief, speed in delivery is not the primary advantage in flying these urgently needed aircraft from their American birthplace to this country. Indeed it is doubtful, when all the factors involved are taken into consideration, if delivery by this means is actually an appreciable time-saver, for it must be remembered that extra time is absorbed in fitting additional tankage and certain special transatlantic navigational equipment, all of which has to be removed again, when the machines get here, before they can be fitted out for their operational duties. If this is set against the saving in time on both sides of the Atlantic, when machines are crated for shipment immediately on structural completion at the factories and assembled and equipped on arrival here

without first having to remove their special transatlantic flying gear, then the hours saved on the actual trip are probably just about absorbed by the extra work involved.

What certainly is a very big advantage, however, is the saving in valuable shipping-space and the elimination of the risk of loss by enemy action in transit. In addition, the flight itself constitutes a very thorough test of the machines.

American volunteers as well as Canadian and British pilots are engaged in this transatlantic ferry service, and later return in parties by boat to the American continent to bring over the next batch of machines ready for delivery. Already some excellent times have been put up for the West-to-East crossing, and a new record has, it is reported, recently been created by Capt. Pat Eves, a British Airways pilot loaned to the Ministry of Aircraft Production, though which particular type of American aircraft he was flying has not been disclosed at the time of writing. Neither is it permitted to give Capt. Eves' new record figures, nor to reveal his points of departure and landing.

The record previously stood at 10 hours 33 minutes, however, and was set up in September, 1937, by the (then) Imperial Airways flying-boat *Cambria* during an experimental flight from Botwood to Foynes.

Capt. Eves' time, however, must have been extraordinarily good if it is true, as reported in *The Times*, that he had breakfast before starting and arrived at his English destination in time for tea, especially when one remembers that when it is breakfast-time in America it is already lunch-time over here!



Washington's new airport was viewed by the author from a non-rigid.

OVER GRAVELLY POINT in a BLIMP

*A Further American Experience by the Amazing President of the
Royal Aeronautical Society*

By GRIFFITH BREWER

THE Washington Press is jubilant in declaring that the U.S. Army has stepped aside to make available to Great Britain 46 giant four-engined long-range bombers in time for an anticipated spring-time aerial offensive. This is an example of the good will one hears everywhere over here. In America, from the Atlantic to the Pacific, there are civil airports all provided with hard runways on which the heaviest machines are landing all day and all night. Has England similar facilities for heavy land machines?

Although Washington is not on the main route from New York to the "Coast," it has three airports: the Navy, the Army and the Civil, each with its runways. The civil airport is one of the oldest, and is now considered inadequate for the air traffic. A new airport is therefore being constructed at Gravelly Point, and, as it is not open for inspection on the ground, I took advantage of the Goodyear airship to obtain an air view of its construction and location.

I went to the old Hoover airport, which is only a mile away from the centre of the city, and paid my \$3

for a seat in the so-called "Blimp." The air was calm and clear, ideal for a sight-seeing trip over Washington. I was the only embarking passenger.

On the ground a crew of ten husky men awaited the approach of the airship. Four of them caught the landing guys which hung from the bows, and as the airship came down on its spring-supported swivel wheel below the car, the others ran to the supporting rail and held the ship firmly as the three passengers alighted. The ground crew had judged my weight while I walked to the landing spot, and as the passengers got out balanced the lift by putting in some 25 lb. bags of shot to make up the deficiency. Their judgment was so good that the exact amount of lift was secured without further weighing up, and in two and a half minutes after landing the airship was released and we started on the regulation twenty-minute flight over Washington.

The airship rose at an angle of 20 deg. with both propellers pushing, and in less than a minute we were at 1,200ft. and going along at 40 miles an hour. We crossed the Potomac and went over the Lincoln

OVER GRAVELLY POINT IN A BLIMP (Continued)

Memorial, leaving the Washington monument on our right. Our route followed the northern side of the city, giving a splendid view of the greatest cluster of monumental structures anywhere in the world built in the last sixty years with the resources of the greatest world power. Fifty years ago only the Capitol and the Washington monument, at opposite ends of the city planning scheme, were completed, and now, with only half the work accomplished, the civic centre is greater than anything the world has ever known.

Navy, Army and Civil

On the left on the far side of the Anacostia River, Bolling Field, the Naval air station, is seen and adjoining the Army flying field, both with their runways. To the right on the opposite side of the Potomac, below its junction with the Anacostia where the two rivers join and broaden considerably, is the nearly completed new municipal airport. The site seems admirably chosen on the convex bend of the broad river, affording open approaches to the runways from three directions. On the landward side there are no tall buildings or any obstructions which could trouble the landings or take-offs of the heaviest machines.

The Highway Bridge, which makes the old Hoover airport so accessible to the city, also serves the new field, the old being on the right while the new is on the left of the bridge approach. These are the air

facilities at Washington, which does not pretend to be one of the leading airports of America. They all have runways on which the heaviest aircraft do not hesitate to land. They know a wheel loaded up to twenty tons will not sink on the runway surface. Where in England are the landing facilities comparable?

It is not necessary for me to stress the advantages of the hard runways used on the American airports, but many argue that they are unnecessary in England because we use smaller machines. But I would urge that we should have these same facilities for landing huge heavy aircraft because no one can say when they may be wanted. The Stratoliner weighs 45,000 lb., and machines are under construction over here of double that weight. These heavy machines are no doubt intended for peaceful purposes, but who knows when they may be modified for the grimmer task of defending the island fortress. Let us therefore be ready to receive them when they come, as come they will in one form or the other.

[The official opening of the new national airport at Gravelly Point has had to be postponed. It had been intended to hold a ceremony there on "Kitty Hawk Day," December 17th, but the road surfaces had not been finished, and cannot be finished until the spring. It is now the intention to hold the opening ceremony in March. In the meantime the aerodrome facilities are available for alternative use.—Ed.]

THE AIR TRAINING CORPS

Rush to Form Squadrons : Crest and Motto Wanted

CITIES and counties throughout the United Kingdom are competing in a race to form their quotas of local squadrons of the A.T.C.—the new air training corps for boys from 16 to 18.

A quota of squadrons, which will have a maximum strength of 200 cadets, has been allotted to counties and principal towns of England, Scotland, Northern Ireland and Wales. The quotas are on a population basis, and range from 86 squadrons for London to one each for Anglesey (Wales), Banff (Scotland) and Fermanagh (N. Ireland). Counties with big quotas of squadrons include Lancashire (100), Essex (35), Middlesex (32) and Glamorgan (24); whilst the cities of Birmingham, Liverpool, Manchester and Sheffield are set to raise 20, 16, 14 and 10 squadrons respectively.

First step to raise local squadrons is the creation of a local committee of prominent citizens whose job it is to find a commanding officer, headquarters and so on for the squadron. The Air Ministry is sending letters to Mayors and Provosts and the Chairmen of County Councils, giving details of the A.T.C. scheme, and urging their co-operation in forming the local committees. Sir Archibald Sinclair has written personally to the Lord Lieutenants of every county where a Territorial Army and Auxiliary Air Force Association exists, inviting their help in getting the committees started.

In many districts committees of the Air Defence Cadet Corps, which is to be absorbed into the new A.T.C., already exist. But even in these areas considerable local effort will still be needed to reach their new quotas of local squadrons. The flood of enquiries being received at the Air Ministry Information Bureau, many from people offering their services in forming squadron committees, is an indication of the widespread local effort already gathering momentum.

Following the announcement that H.M. The King has graciously consented to become Air Commodore-in-Chief of the Air Training Corps, a proposal has been made to have a crest and motto for the new corps. The motto of the R.A.F. is the famous "Per Ardua Ad Astra," and each squadron has its own crest and motto. The usual practice of using Latin words need not necessarily be followed. "Be Prepared" is an example of a motto in our mother tongue which has become world-famous.

Mr. Wolfenden, Director of Pre-entry Training at the Air Ministry, would welcome suggestions for a suitable crest and motto for the new corps. They should be addressed to the Air Ministry Information Bureau, Kingsway, London, W.C.2, marked "A.T.C. Crest."

A telegram was received by the Air Ministry from the A.T.C. Area Controller for South Wales to say that Newport (Mon) had already got its first A.T.C. squadron committee formed, had selected officers, found headquarters, and had begun recruiting. Thus presumably the honour of being the first A.T.C. squadron will go to Newport. Suggestions for the crest and motto have poured into the Air Ministry, but no selection has yet been made.

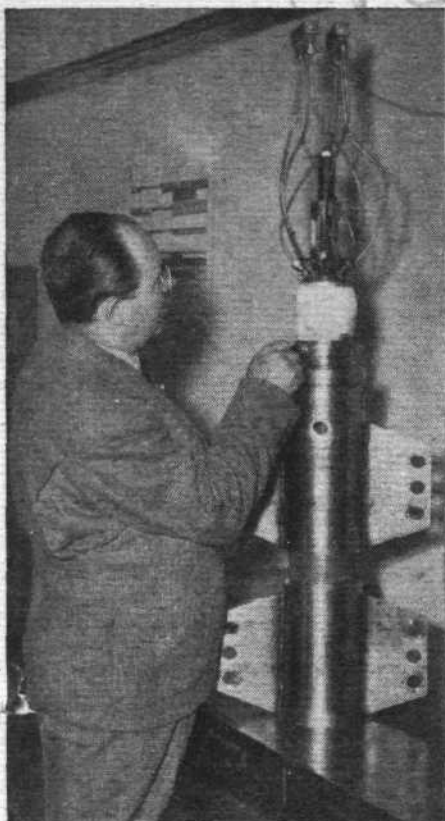
Kelly's

IN compiling the previous edition of the Post Office London Directory the publishers were called on to meet a number of unprecedented difficulties created by the evacuation of business firms from London on the outbreak of war. These difficulties, however, were small compared with those met with in producing the 1941 (142nd Annual) edition of this well-known work of reference, since on this occasion the publishers were called upon to deal with a City continually subject to air attack. None the less, the Post Office London Directory has appeared at its usual time (and almost in its usual form) to show that London still stands where she did, and that the activities of her professional and commercial community remain unimpaired.

The policy of showing in the Commercial Alphabetical Section the emergency addresses of the offices of firms who have moved temporarily from London has been continued, and what has been done in this direction cannot fail to be of vital assistance to the commercial community. There are also a number of cases where firms have moved certain departments of their business from their London offices; these also have been dealt with in this edition.

The price of the Directory, in spite of largely increased costs of production, remains at 60s., and it is, of course, published by Kelly's Directories, Ltd., of 186, Strand, London, W.C.2.

HERE AND THERE



JET PROPULSION: Mr. E. D. Myers with his "blast engine" which is said to use a mixture of two liquid fuels. During development Professor Alexander Klemin was consulted.

Canadian Appointment

THE appointment of Squadron Leader Thomas R. Loudon, who for the past several months has been in charge of the R.C.A.F. School of Aeronautical Engineering at Montreal, to the post of Chief Technical Officer of the Flight Research Establishment at Ottawa, is recorded in the December issue of *Canadian Aviation*. With this goes promotion to the rank of Wing Commander. He is also professor of applied mechanics at the University of Toronto.

New Engines for T.W.A.

ALL the Douglas DC-3s of the T.W.A. fleet are being re-equipped with the more powerful Wright G-200 Cyclone. The large number (in the civil world) of 111 of these engines are required and the cost is reported to be \$1,100,000. The later DC-3s which T.W.A. is receiving have a longer cabin to house an additional three passengers and the payload has been increased by 800 lb. because of the increased engine power.

The G-200 is a 9-cylinder radial and there are six variations of it. It can have a compression ratio of 6.7 for 90 octane fuel, or 6.3 for 87 octane. It is rated at 960, 1,100 or 1,200 h.p. for take-off, those being fitted to the T.W.A. fleet being of the 1,200 h.p. rating.

Increase in Air Travel

IN spite of the war, records for passenger air-travel were broken at Christmas-time in the British Isles, a total of 392 passengers being carried during the week ending Dec. 24 on the service operating between Manchester and Dublin. This was 129 more than during the same period of 1939, which was in itself a record. The increased demand on this service was so great in fact, that from

Dec. 16 onwards it was necessary to augment the normal schedule.

On Friday, Dec. 20, no fewer than 87 persons flew home for Christmas between Great Britain and Eire, and this was the greatest number of passengers ever carried in one day on this service.

1,000 per Month

MR. C. E. WILSON, acting president of General Motors, predicts that within a year the output of Allison engines will be 1,000 per month.

Exchange Not Robbery

TWENTY Boeing "flying fortresses" and the Sperry bombsight are said to go to Britain in a deal by which we release engines to equip heavy bombers for the U.S. Army. According to *Aviation* (N.Y.), the swap includes 26 Consolidated B-24 bombers now under construction.

Spin Strips

ONE experimental form of the Fairchild PT-19, a low-wing, single-engine monoplane trainer, had what are called "spin strips" on the leading edge. The company decided to develop a low-wing monoplane for training purposes and realised that they should seek to eliminate any undesirable wing tip stalling characteristics. So built-in fixed slots of the "pillar-box" type were added near the tip. Flight research with wool tufts showed that this altered wing stalling but increased tail buffeting, so a similar slot was added in the wing near the root to improve flow conditions at the stall there.

It was then seen that the same result could be achieved with a small strip on the leading edge between the two slot positions, since this would force the stall to occur there before at the tip and with no more loss of lift coefficient. But even this device was abandoned in

favour of a wing with neither slots nor strips, the new wing having a slightly greater thickness towards the tip and a washout increased by 0.5 deg. As adopted, the wing was of NACA 2416 aerofoil at the root, NACA 4409 at the tip, and had an aerodynamic twist with respect to zero lift line of 2 deg. washout.

Diesel Postponement

MANUFACTURE of the Guiberson diesel, described in *Flight* recently, has had to be shelved on account of pressure of other work, mainly on radial diesels for Army tanks.

U.S. Navy Orders "Blimps"

PLACING of orders for 48 non-rigid airships has been authorised by the United States Congress, and the Goodyear company (the only bidder) has been awarded an order worth \$1,324,000. The order is for patrol and training airships. The former will be of 123,000 cu. ft. capacity, with a length of 246ft.

DC-5s in the Dutch East Indies

TWO more Douglas DC-5 air liners have been added to the K.N.I.L.M. fleet and are already in service in the Netherlands Indies. The planes were assembled, on arrival at Sourabaya, under the supervision of a mechanic from the Douglas factory at Santa Monica, and were then flown to Bandoeng to the technical department of K.N.I.L.M. for the "finishing touch." These are the first machines with nosewheel undercarriage to be operated commercially in this part of the world and the greater safety in landing during bad weather will no doubt be a great asset in this land of sudden and violent storms. The DC-5, a high-wing monoplane giving its 21 passengers an uninterrupted view of the tropical land and sea-scape, is equipped with a bar and "the usual offices."



IN THE NEW YEAR HONOURS: Mr. F. S. Spriggs, upon whom has been conferred a knighthood, is managing director of the Hawker Siddeley group and chairman of the operating companies, Armstrong Siddeley, Armstrong Whitworth, Avro, Hawker, Gloster, and A.S.T.

HERE AND THERE (Continued)

Airacobra Armament

ACCORDING to advice from America, on the Bell Airacobra single-seater fighter (Allison liquid-cooled engine), of which 1,600 are said to have been ordered by America and England, the armament is to include eight machine guns and a 37-mm. cannon.

Tourjours la Politesse!

IN the course of an interview in New York, Sir Walter Citrine, Secretary of the Trades Union Congress, made some encouraging observations on the way in which that country's aircraft industry is getting a hustle on to supply Great Britain with planes and engines. With the tactful courtesy of a diplomat he referred to "American radial-engines, the finest in the world . . ."

Well, the Yankee radials are, beyond all argument, very, very fine products, but all the same there is quite a nice little job called "Bristol"!

On Their Way

MORE than 40,000 men have now enlisted in Australia under the Empire Air-training Scheme. The majority of these will come direct to Great Britain on completion of training, but a small proportion will reach us by way of Canada where many Newfoundlanders, as well as Canadians, are now in training. These include pilots, observers and radio operator-air gunners. Other training schemes in operation in Southern Rhodesia and the Union of South Africa possess 15 centres for preliminary and advanced flying training.

Canadian Aeronautical Laboratory

THE buildings for Canada's new aeronautical research centre are being built about three miles outside Ottawa. Standing in a property of one hundred acres, the first three buildings were nearing completion at the end of last year, and the plan provides ultimately for another three. Large and small wind tunnels and a 600ft. tank with a width of 25ft. will be included among the equipment. There will also be a vertical spinning tunnel. The engine laboratory will have two test beds, for 500 and 1,000 h.p. engines, and the mechanical testing laboratory will be equipped to test full-sized aircraft components. Other scientific work in addition to aeronautical will be carried on at the centre, which will have hydraulic, electrical and acoustical sections.

Cold Starting

STARTING from cold has always been one of the operating problems of the internal-combustion engine, one of the main difficulties being the greater effort required to turn the engine over against the increased viscosity of the oil at low temperature. A system designed to counteract this has been developed by Mr. Weldon Worth, of the U.S. Army Air Corps, and is being experimented with in the Intava Laboratories. This consists in metering a small amount of petrol into the lubrication system of an engine before it is finally stopped after its last flight for the day. All the working parts thus

become covered with a film of diluted low-viscosity oil, so rendering the engine easy to turn over when cold, even after long periods of standing. The warmth of subsequent running soon evaporates off the petrol and restores the oil to its original state.

Qantas Captain

WITH flying time which has now passed the total of 11,321 hours, Capt. R. B. Tapp is one of the Qantas flying-boat pilots who has been flying since 1917, when he gained his wings with the Royal Flying Corps. After the war he was in India on the North-West Frontier, and then, in 1927, was test pilot for Westlands. Joining Qantas in 1928, he was on the landplane service from Brisbane to Camooweal. In 1937 he obtained flying-boat endorsements to his licence, and since then has been on the Sydney-Singapore section of the Empire flying-boat route.

Chief Naval Representative

AS reported in *Flight* of January 9, Admiral Sir Noel Laurence has been transferred to the Ministry of Aircraft Production. His official title is Chief Naval Representative, and he is responsible for overseeing the development and production of aircraft and their equipment for the Fleet Air Arm. In future we should hear less of the complaint that the Admiralty is not getting the types of aircraft it wants. The word "development" in the official announcement seems to be the significant one.

Still They Come!

MONEY continues to roll into the national coffers in large lumps from various sympathetic sources overseas, earmarked for the acquisition of more and more aircraft with which to defeat the horrible Hun.

The Belgian Government recently decided to give £100,000 to the Spitfire

Fund, and it is intended, most fittingly, that some of the fighters this handsome gift provides shall be flown by Belgian airmen who are already fighter pilots in the R.A.F. Yet another contribution to our air strength in the form of a complete squadron is to come from the Shanghai British War Fund, which has now topped the £100,000 mark. This new "gift" squadron, the precise character of which is not yet specified, is to be known as the British China Squadron.

New K.N.I.L.M. Service

LAST month saw an important event in commercial aviation with the opening of the new K.N.I.L.M. line to the Moluccas—or "Spice Islands"—and New Guinea. Lockheed 14s fly the first stage from Batavia to Makassar (capital of Celebes) via Sourabaya and Bali, and the next day a Grumman amphibian completes the trip.

As oil has lately been found in Dutch New Guinea the new service is of considerable importance, especially as it cuts down what was formerly about a month's journey by boat to a two-day air trip. Incidentally, the "Spice Islands" were the original settlements of the Hollanders centuries ago, but when trade shifted to Java and Sumatra they lost much of their interest.

Death of Sylvester Delaney

FLIGHT learns with regret that on January 6 Mr. L. T. Delaney received the following telegram from the Air Ministry: "Deeply regret to inform you that further information received states that your son, F/O. Luke Sylvester Delaney, previously reported missing, is now reported to have lost his life as a result of enemy action on the 6th." It will be remembered that young Delaney was, before the war, a Brooklands enthusiast, keen on helping his brother, C. T. Delaney, with his Lea Francis car in the various events for which it was successfully entered.

AMERICA'S USE OF MOTOR INDUSTRY

FOR her aircraft production programme America is to make extensive use of her motor car industry. Exactly how it is to be done is a matter to be decided by a survey now taking place. According to our New York contemporary, *Aviation*, planning has gone farthest in the matter of bombers, and it is likely that a four-engined heavy bomber will be included. It is thought that its design will probably be based on the Consolidated B-24, and there are to be 4,000 of these. Some 8,000 twin-engined bombers resembling the Martin B-27 are to be built in addition. It is believed that 8,000 fighters will be included in the programme, but the type to be adopted is still in doubt. Of these 20,000 aeroplanes Great Britain is, according to *Aviation*, to receive approximately 12,000, equally divided between bombers and fighters.

The intention is that the American automobile industry is to produce parts for these aircraft, and sub-assemblies up to tail and wing portion size. The general idea is that the American automobile industry can make available a

number of general-purpose machine tools by working three shifts on its remaining tools. It is not thought that production of dies will present a serious difficulty, as the tool and die shops in Detroit, with some 10,000 workers, are at a low level of activity at the moment.

Final assembly cannot be done at the automobile factories, so that special factories are to be built for assembly. These will be paid for by British and American funds. The assembly plants will have to be managed by experts drawn from the aircraft industry, and our contemporary points out that "the industry's executive and supervisory forces are already spread out so thin as to have an adverse effect on production." If the programme is treated as an emergency programme, for immediate production, the methods in use in the aircraft factories will be duplicated. On the other hand, if a long-term policy is decided upon, special tools would have to be produced, and it would take longer to get going, although ultimately a very much greater production might be achieved.

Service



Aviation

Royal Air Force and Fleet Air Arm News
and Announcements

Canadian Air Council Appointments

AIR COMMODORE G. O. JOHNSON now becomes Deputy Chief of Air Staff, he was Air Member for Organisation and Training. Air Commodore R. Leckie is appointed Member for Training and Group Capt. S. G. Tackaberry Member for Supply. Aeronautical Engineering is now in the hands of Air Vice-Marshal E. W. Stedman.

Night Bombing Panacea

AIR CHIEF MARSHAL SIR HUGH DOWDING, until recently C-in-C. Fighter Command and now in America on a special mission for the Ministry of Aircraft Production, is credited with having stated at Ottawa that he confidently believed it would not be long before all the weight and sting had been taken out of night bombing attacks. Equipment for a new method of air fighting was being rapidly completed, and he expected the worst of the night bombing menace to be over by the spring.

University Courses

YOUNG men who have volunteered as pilots, observers and wireless operator-air gunners in the Royal Air Force, and who are now on deferred service, may apply to be considered for the special university courses recently announced in connection with the new air training corps. These courses, which will last six months, are intended for young men who are considered likely to be suitable for commissioned rank in the R.A.F. The qualities specially looked for are good physique, intelligence, initiative and power of leadership. The "deferred service" candidates who are eligible for nomination are those under the age of 18 years and 8 months and who have been attested with the R.A.F. for air crew duties but have not yet entered training.

ALL ABOARD: Act. Sqn. Ldr. Whitney Straight, who was recently awarded the Military Cross. It was he who laid out the 'drome for a Gladiator squadron on a frozen lake in Norway.

Foreign Decorations

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

CONFERRED BY THE PROVISIONAL
CZECHOSLOVAK GOVERNMENT.

CZECHOSLOVAK MILITARY CROSS OF 1939.

Wing Cdr. John Francis GRIFFITHS, D.F.C.
Wing Cdr. Alfred Basil WOODHALL.
Sqn. Ldr. Henry Rudolph GRAHAM.
Sqn. Ldr. George Douglas Morant BLACKWOOD, R.A.F.O.

Act. Sqn. Ldr. Jerrard JEFFERIES, D.F.C.
Flt. Lt. Gordon Leonard SINCLAIR, D.F.C.
F/O John Eric BOULTON. (Killed in action.)

CZECHOSLOVAK MEDAL FOR GALLANTRY.

Flt. Lt. Anthony Harold Scott BROWNE, R.A.F.V.R.

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.

The number after each name indicates the squadron with which the recipient is serving.

DISTINGUISHED FLYING CROSS.

Wing Commander Noel C. SINGER, D.S.O.—No. 101.
Wing Commander Peter W. M. WRIGHT—No. 114.
Squadron Leader Harold Peter BROAD—No. 44.
Squadron Leader Ronald Neville CLARKE.
Squadron Leader Richard C. M. COLLARD—No. 57.
Squadron Leader Albert GOLDING—No. 37.
Squadron Leader Geoffrey P. HAEGER—No. 202.
Squadron Leader W. J. HICKEY—No. 80. (Since died of wounds.)

Squadron Leader George Frank LERWILL—No. 144.
Acting Squadron Leader Hugh Charles MACPHAIL.
Acting Squadron Leader B. D. SELICK—No. 214.
Acting Squadron Leader D. G. TOMLINSON—No. 10.
Flight Lieutenant Edward John BROOKS.
Flight Lieutenant Raymond N. COLLINS—No. 144.
Flight Lieutenant Norman F. EAGLETON—No. 202.
Flight Lieutenant M. F. C. FAHRAH—No. 202.
Flight Lieutenant Hugh J. GARLICK—No. 202.
Flight Lieutenant W. D. HODGKINSON—No. 220.
Flight Lieutenant Gerald T. PALMER—No. 59.
Flight Lieutenant William J. WOODS—No. 261.
Act. Flight Lieutenant L. E. CLARK—R.A.F.V.R.
Act. Flight Lieutenant M. J. C. MARKS, R.A.F.V.R.—No. 44.

Flying Officer H. M. F. BARNITT (since killed on active service)—No. 203.

Flying Officer John R. D. BRAHAM—No. 29.
Flying Officer Mervyn M. FLEMING—No. 58.
Flying Officer Francis A. G. LASCELLES—No. 105.
Flying Officer Guy Jerrold MENZIES—No. 139.
Flying Officer C. M. MILLER, R.A.F.V.R.—No. 9.
Flying Officer Peter WARD-HUNT—No. 49.
Pilot Officer Everett Large BAUDOUX—No. 233.
Pilot Officer John James CAMPBELL—No. 49.
Pilot Officer R. C. DAFORN, R.A.F.V.R.—No. 501.
Pilot Officer Reginald Edgar GLOVER—No. 101.
Pilot Officer John Henry GREEN—No. 49.
Pilot Officer Roderick F. HARMAN—No. 9.
Pilot Officer Harry John HARTLAND—No. 114.
Pilot Officer C. E. HILL, R.A.F.V.R.—No. 101.
Pilot Officer Geoffrey Maurice ROTHWELL—No. 99.
Pilot Officer Malcolm ROWELL—No. 99.
Pilot Officer Jack Frederick SACH—No. 214.
Pilot Officer James Henry STEYN—No. 10.
Pilot Officer H. R. STOCKINGS, R.A.F.V.R.—No. 44.

BAR TO THE DISTINGUISHED FLYING MEDAL.
Sergeant George A. WATSON, D.F.M.—No. 114.

DISTINGUISHED FLYING MEDAL.

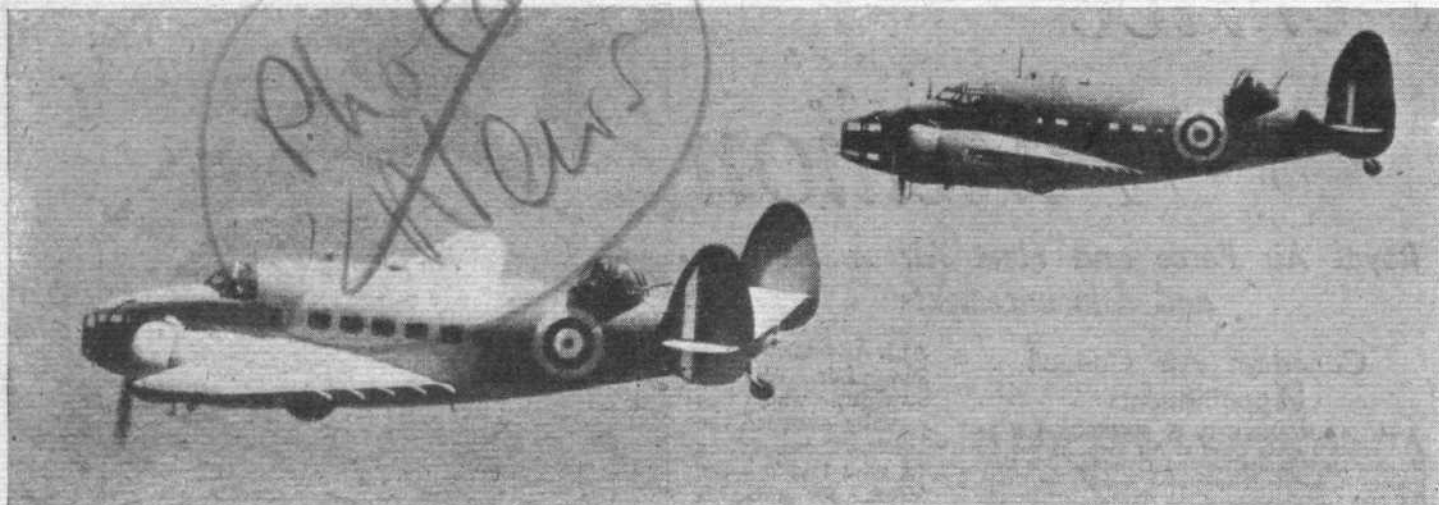
Flight Sergeant Wellesley Spencer MUNN—No. 29.
Sergeant William ADAMSON—No. 77.
Sergeant R. W. H. BAXTER, R.A.F.V.R.—No. 83.
Sergeant Frank BELFITT—No. 50.
Sergeant Vernon Foster BILBROUGH—No. 115.
Sergeant Jack BLYTH, R.A.F.V.R.—No. 37.
Sergeant J. W. H. BROWN, R.A.F.V.R.—No. 58.
Sergeant Ronald Edmund CHARLTON—No. 77.
Sergeant John Joseph CLINCH—No. 83.
Sergeant Frederick George CONSTABLE—No. 83.
Sergeant Thomas Edward COGAN—No. 77.
Sergeant Fred CORLETT, R.A.F.V.R.—No. 77.
Sergeant William Albert Walter COX—No. 61.
Sergeant Michael George COYLE—No. 114.
Sergeant James Ferrie CRAIG—No. 58.
Sergeant John Richard CURRIE—No. 44.
Sergeant Reginald Charles DUNBAR—No. 37.
Sergeant John Raymond E. FULLERTON—No. 50.
Sergeant John James GALE—No. 102.
Sergeant S. R. GARRARD—No. 75 (New Zealand).
Sergeant Francis Frank GARRITY—No. 206.
Sergeant Arthur HALPENNY—No. 44.
Sergeant Douglas Albert E. HAMMATT—No. 83.
Sergeant S. E. HARRISON, R.A.F.V.R.—No. 61.
Sergeant John Elias JONES—No. 50.
Sergeant Leonard Francis KNEIL—No. 44.
Sergeant David LORIMER—No. 44.
Sergeant Peter V. McLAREN, R.N.Z.A.F.—No. 44.
Sergeant T. L. MUMBY—No. 75 (New Zealand).
Sergeant R. G. W. OAKLEY, R.A.F.V.R.—No. 61.
Sergeant Dennis Howard Glyn POOLE—No. 115.
Sergeant George Basil RANK—No. 110.
Sergeant Henry RHODES—No. 110.



C-IN-C. BOMBER COMMAND: Air Marshal Sir Richard Peirse, K.C.B., D.S.O., A.F.C., who started his flying career in the Royal Naval Air Service and had his first bombing experience over Ostend and Zeebrugge in the 1914-18 war.

TOPICAL

SERVICE AVIATION (Continued)



COASTAL COMMAND HUDSONS : During 1940 Coastal Command aircraft of all types flew over 34,000,000 miles in co-operation with the Royal Navy.

Sergeant R. C. G. ROSEVEAR, R.A.F.V.R.—No. 58.
 Sergeant Henry Richard SANDERS.—No. 83.
 Sergeant Eric Stephan SMITH.—No. 50.
 Sergeant Arthur STOKES.—No. 102.
 Sergeant Joseph TAYLOR, R.A.F.V.R.—No. 61.
 Sergeant Thomas Stanley W. TOWELL.—No. 10.
 Sergeant Robert Langlands TURNER.—No. 50.
 Sergeant Joseph UNSWORTH.—No. 49.
 Sergeant Alexander WAPPETT.—No. 50.
 Sergeant William Thomas WATKINS.—No. 149.
 Sergeant G. V. WEDLOCK, R.A.F.V.R.—No. 235.
 Sergeant George Peter WISE.—No. 50.
 Sergeant Frederick John Ernest WOMAR.—No. 144.
 Sergeant Samuel David YEOMANS.—No. 44.
 Leading Aircraftman Richard S. BREEZE.—No. 202.
 Leading Aircraftman D. H. BUTTON.—No. 202.

THE King has been graciously pleased to approve the undermentioned awards in recognition of gallant conduct:—

AWARDED THE MILITARY MEDAL.

L.A/C. Sydney LEDWARD.—In August, 1940, during an air raid on an aerodrome, this airman rendered first aid to twenty-five casualties and removed five others to safety whilst bombing was actually proceeding. Later in the month he re-

mained cool and collected during another air raid and again rendered first aid when and where required. He has also acquitted himself in a praiseworthy manner when aircraft have crashed and burst into flames.

A/C.2 Oliver Henry HEWITT.—Immediately after a heavy bombing raid on a Royal Air Force station this airman volunteered to control a fire which threatened an ammunition store. Without hesitation, he drove the station crane from its partially demolished garage, though the petrol tank of the crane was punctured and petrol was pouring towards the fire. His calmness and courage, in spite of continued enemy air activity, undoubtedly saved the ammunition store.

Act. Sgt. Jean Mary YOULE, W.A.A.F.—In August, 1940, Sgt. Youle was on duty in a Station telephone exchange when the Station was attacked and bombed by five enemy aircraft. Part of the building containing the telephone exchange suffered a direct hit and other bombs fell in very close proximity. The telephone staff were subjected to a heavy rain of debris and splinters and to the noise of the concussion of exploding bombs. It was solely due to the cool bravery of, and superb example set by Sgt. Youle, that the telephone operators carried on with their task with

calmness and complete efficiency at a most dangerous time for them. She has at all times set an excellent example of coolness and efficiency to all.

Act. Cpl. Joan HEARN-AVIS, W.A.A.F.—In August, 1940, during an enemy air attack, bombs were dropped on buildings of the unit doing very considerable damage. Several heavy bombs fell alongside a block where Cpl. Hearn-Avis was working alone controlling telephones. Every window was blown in and one of the main walls of two rooms was badly cracked. Throughout the attack Cpl. Hearn-Avis remained at her post in a building which threatened to collapse about her, doing her work as far as the terrific noise would permit. This airwoman displayed courage and devotion to duty of the highest order.

MENTIONED IN DESPATCHES.

(Continued from page 60, Jan. 16th, 1941.)

LEADING AIRCRAFTMEN.

F. Ackroyd, T. Atkinson, V. S. G. Barrow, J. J. Birchall, C. J. Broomhead, E. A. Brown, G. Brown, C. J. Bubb, A. E. Butler, E. D. Butler, O. H. Campbell, P. G. Candy, C. E. B. Cavanagh, J. J. Chamberlain, R. S. P. Corrick, H. Cowling, A. D. F. Craig, M. L. Donohoe, H. R. Doult, J. Feeney, W. J. Godley, N. A. Hill, A. W.



ON THE QUI VIVE : The businesslike and beautiful lines of the Spitfire are accentuated in this side view of a take off. The projection above the windscreen is a mirror to enable the pilot to see if all is clear behind.

SERVICE AVIATION (Continued)

Holland, S. C. Hopkins, T. Hopper, D. J. Horsburgh, D. H. Howland, J. F. Jackson, W. L. James, E. Jeffries, H. B. Jones, C. G. Landon, W. G. Lemon, R.A.F.V.R., M. M. G. Lewis, R.A.F.V.R., J. R. Lisgo, G. E. Lister, W. McClyment, A. P. McCormack, R. McLellan, F. H. C. Mallett, L. V. Matthews, J. H. Middleditch, J. A. Monks, D. Moore, S. Morris, F. D. L. Oakwell, D. H. Over, W. A. Pethig, A. H. Pilbeam, J. H. Preece, F. M. Rensberry, S. Reynolds, G. J. Russell, H. C. Shipton, J. N. Simpson, D. Smith, G. F. Smith, R. Stephenson, T. A. Stutard, G. Thornton, D. G. Turrell, A. H. Vaughan, J. M. Whitley, T. J. Williams, W. E. Williams, E. E. Wilson, P. J. Woodall, G. L. Woods, F. C. Woodward, M. M. Yendall.

AIRCRAFTMEN 1ST CLASS.

J. S. Abbott, C. B. Arnold, J. Atkinson, W. A. J. Brooks, W. F. Cannell, T. J. Elliott, M. K. Garland, R.A.F.V.R., A. G. Garrett, J. Graham, J. J. Hackett, R.A.F.V.R., F. Hall, R.A.F.V.R., H. J. Hancock, W. J. Kay, G. S. Kendrick, R.A.F.V.R., H. H. Leveck, R. Norman, R.A.F.V.R., A. B. Pitt, A.A.F., W. A. Reeve, W. G. Shecan, C. Smith, L. H. Stride, E. S. Vale.

AIRCRAFTMEN 2ND CLASS.

J. K. Brown, R. D. C. Carter, W. J. Cayett, W. J. Cross, R. Dugdill, G. Duncan, C. C. E. Frearson, A. G. Haslett, R. Hilditch, E. B. Knell, R. E. Lea, L. Lockwood, C. E. E. Mansfield, A. J. Nunn, C. Platt, C. G. Stutley, A.A.F.

W.A.A.F.

FLIGHT OFFICERS.

E. M. McLeod, C. Woodhead.

SECTION OFFICERS.

D. R. J. Burnett, S. V. Williamson.

ASSISTANT SECTION OFFICERS.

P. H. Dunn, J. M. Reed, M. I. de C. Taudevin.

SERGEANTS.

E. M. Brooke, M. M. Davenport, C. A. M. England, E. M. Flanagan.

CORPORALS.

E. I. D. Mossop, E. Smart, M. E. Wherry.

H. W. Inkersole (Act.).

AIRCRAFTSMAN 2ND CLASS.

J. Dickens.

COMMENDATIONS.

THE KING has been graciously pleased to give orders for the publication of the names of the undermentioned personnel in the *London Gazette* as having been brought to notice for valuable services rendered in connection with the war:—

AIR VICE-MARSHAL.

J. S. T. Bradley, O.B.E., E. W. Havers (Act.), L. D. D. McKean, O.B.E. (Act.).

AIR COMMODORES.

W. J. B. Curtis, O.B.E., A. Grant, M.B.E., G. C. Pirie, M.C., D.F.C., D. Colyer, D.F.C., L. N. Hollinghurst, O.B.E., D.F.C. (Act.), R. P. M. Whitham, O.B.E., M.C. (Act.).

GROUP CAPTAINS.

G. G. Banting, A. P. Besley, A.A.F., E. B. C. Betts, D.S.C., D.F.C., E. J. Cuckney, D.S.C., T. Fawdry, O.B.E., G. V. Howard, T. S. Ivens, J. W. Jones, A. G. Knight, M.B.E., C. E. W. Lockyer, A. S. Morris, O.B.E., P. D. Robertson, A.M., T. G. Skeats, R. A. Young, L. J. V. Bates (Act.), E. D. H. Davies (Act.), J. A. G. De Courcy, M.C. (Act.), P. J. Farmer (Act.), K. A. Meek, M.B.E. (Act.), V. B. Ranford (Act.), G. Scarrott (Act.).

WING COMMANDERS.

S. J. Bailey, M.B.E., P. M. Brambleby, V. B. Bennett, V. G. A. Bennett, C. E. Benson, A.A.F., B. Caley, M.C., A.A.F., W. W. Deane, J. E. Easton, B. E. Essex, J. G. Franks, C. W. Gore, W. I. Grantham, G. D. Green, J. B. Gregor, R. A. Hall, A.A.F., L. G. Harvey, J. B. Henderson, A.A.F., E. H. Hooper, T. I. Hiff, T. S. James, J. W. Jean, D.S.M., E. C. M. Knott, T. N. McEvoy, D. F. McIntyre, A.F.C. (R.A.F.V.R.), T. F. Moloney, J. A. S. Outhwaite, P. P. S. Rickard, R. Risk, M.C., A.A.F., A. W. Smith, J. E. R. Sownman, H. W. Tait, A.A.F., W. A. Thompson, J. G. W. Weston, E. R. Wood, J. E. Atkins (Act.), R. H. Berryman (Act.), A.A.F., J. H. Green (Act.), A. H. Harrison (Act.), V. H. B. Roth (Act.), J. G. Skeats (Act.), R.A.F.V.R.

SQUADRON LEADERS.

M. E. O'B. Atkinson, A. N. Cole, A. H. E. Dew, A.A.F., W. J. Dew, J. A. Dobson, L. Devle, E. R. S. Johnston, R. E. P. Paynter, D.C.M., J. V. Read, M.B.E., J. Rodger, D.S.M., R.A.F.V.R., E. L. J. Rowe, E. Shipley, E. A. Sullock, A.F.C., R.A.F.V.R., N. H. F. Unwin, R.A.F.V.R., V. E. Vincent, A.A.F., P. W. Bingham (Act.), R.A.F.V.R., H. Furner, R.A.F.V.R., E. H. Hereford (Act.), R.A.F.V.R., J. G. Links (Act.), A.A.F.T.V.R., D. F. Massy (Act.), R. L. Richmond (Act.), A.A.F.

FLIGHT LIEUTENANTS.

W. K. Stewart, R.A.F.V.R., D. S. Pain (Act.), R.A.F.O.

FLYING OFFICERS.

P. H. Knowles, E. B. G. Masfield, C. Scragg, M.B.E.

FLIGHT SERGEANT.

A. J. Webber.

SERGEANTS.

H. P. Hopkins, F. J. Wilson.

MATRON-IN-CHIEF (P.M.R.A.F.N.S.).

E. M. Blair, R.R.C.

WING OFFICER (W.A.A.F.).

F. F. Wynne-Eyton.

SQUADRON OFFICER (W.A.A.F.).

L. M. Crowther.



U.S. SHIPBOARD FIGHTER: The Vought-Sikorsky XF4U-1. A single-seater all-metal machine with an 18-cylinder Pratt & Whitney two-row radial of 1,850 h.p.

Roll of Honour

Air Ministry Casualty Communique No. 57.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—P/O. W. A. Bates, 86711; Sgt. A. M. Birt, 759123; P/O. C. F. A. Capon, 42741; Sqn. Ldr. C. J. S. Dickinson, 34149; P/O. K. J. Dobbie, 79157; Sgt. J. Docker, 938826; Sgt. G. R. Ellerington, 627175; P/O. D. J. Fielder, 80837; Sgt. R. H. B. Fraser, 741810; Sgt. J. P. Gapp, 745876; Sgt. R. N. Harrison, 741615; Sgt. R. G. Hart, 647852; Sgt. A. W. Hodgson, 636770; Sgt. M. Holker, 968318; Sgt. L. E. Holland, 516539; Sgt. D. G. How, 742696; Sgt. H. N. Howes, D.F.M., 740896; Sgt. J. D. Hunt, 553383; Sgt. R. S. Hutton, 754874; Sgt. E. B. D. Jenkins, 749696; Sgt. I. J. Johnson, 938783; P/O. D. C. Leary, D.F.C., 42756; P/O. F. W. McMurray, 85277; Sgt. J. L. Maguire, 581234; Act. Flt. Lt. I. H. Meggitt, 40633; Sgt. W. E. Need, 751416; Sgt. A. Newman, 515013; Sgt. L. W. Nichols, 902486; Sgt. L. J. Peachy, 749539; F/O. J. R. Rathbone, M.P., 72451; Sgt. P. V. Renai, 480978; Sgt. N. G. Riddell, 616809; Sgt. R. M. Rodgers, 751935; Flt. Lt. L. J. Rooney, 39955; Sgt. H. E. Saxby, 744976; Sgt. W. Skipworth, 742219; Sgt. D. Stephenson, 743026; Act. Flt. Lt. J. D. Steuart-Richardson, 33465; Sgt. G. Southall, 938291; Sgt. K. W. V. Vowles, 625038; P/O. R. Ward, 42471; Sgt. H. B. Whalen, 632938.

PREVIOUSLY REPORTED "MISSING," BELIEVED KILLED IN ACTION "NOW PRESUMED "KILLED IN ACTION."—P/O. R. T. L. Buttery, 70894; Sgt. P. H. Klipsch, 566457; P/O. M. Thomas, 40648; A/C.1 A. S. Ross, 613676; A/C.2 W. C. Waterston, 630224.

PREVIOUSLY REPORTED "MISSING," NOW PRESUMED "KILLED IN ACTION."—Sgt. F. B. Abbott, 563017; Sgt. J. D. Aitchison, 563022; P/O. R. D. Aubert, 41361; Sgt. W. L. Balmer, 564120; Sgt. W. Baxter, 524225; Sgt. P. Bloomer, 580567; P/O. A. F. Booth, 42099; Sgt. C. R. Bowen, 562025; A/C.2 A. C. Brogan, 552071; Sgt. R. E. Brown, 566296; P/O. R. L. Buckley, 84916; P/O. R. W. Burton, 78440; Flt. Lt. P. G. Chapman, 37718; F/O. W. R. Clapham, 25077; Sgt. A. M. Clark, 749331; L.A/C. R. Coalter, 616989; Sgt. C. E. Colbourn, 580435; Sgt. F. Crawford, 620421; F/O. G. I. Cuthbert, 90133; Sgt. T. W. Davis, 580509; Sgt. R. C. Dawson, 637484; Cpl. P. H. D. Dittmas, 550777; Sgt. D. L. Dorris, 749549; Sgt. D. W. Edmunds, A.F.M., 513935; F/O. J. E. Edwards, 36151; Sgt. D. J. Elliott, 749407; P/O. A. Elson, 41272; L.A/C. E. J. Fagg, 540233; F/O. E. C. Ford, 25130; F/O. R. T. George, 40296; P/O. M. H. Gillingham, 79180; A/C.2 H. Gillott, 623761; Sgt. G. E. Goad, 563876; F/O. K. W. Graham, 72424; P/O. H. B. Hackney, 43167; A/C.1 F. Hands, 616584; P/O. D. S. R. Harriman, 41846; A/C.1 F. Harwood, 625809; Act. P/O. J. E. Hatfield, 40474; Sgt. C. R. Heaves, 562741; Sgt. C. Henderson, 755515; A/C.2 J. Henry, 630142; P/O. A. P. B. Hordern, 41418; L.A/C. R. D. Hughes, 551679; Act. Flt. Lt. A. F. Ives, 37782; Sgt. A. F. James, 580961; P/O. D. F. Jones, 42131; F/O. F. D. Jones, 37741; Sgt. R. T. Kidman, 741442; L.A/C. R. J. Lamb, 536874; A/C.1 L. M. Langton, 615807; P/O. F. S. Laws, 41431; L.A/C. W. A. McFadden, 545595; F/O. A. R. J. Medcalf, 90339; Sgt. R. F. Miller, 521994; P/O. J. G. Mitchell, 41862; Sgt. D. V. Moseley, 755471; Sgt. P. E. J. Neale, 749451; P/O. C. Parker, 580804; Sgt. H. A. Peel, 327531; P/O. R. A. Percy, 42640; F/O.

T. V. Pollock, 39115; Sgt. P. Pryde, 551852; Sgt. T. B. G. Pyne, 565921; A/C.1 P. F. Ricketts, 540110; A/C.1 D. Robertson, 633753; P/O. C. S. Robinson, 41470; Act. Flt. Lt. H. C. Samuels, 37901; Sgt. G. L. Schwind, 581353; L.A/C. E. R. Scott, 624256; Act. Sqn. Ldr. W. I. Scott, 34225; Sgt. G. E. Seldon, 563402; P/O. R. E. Shaw, 42575; Sgt. L. F. Tomlinson, 580338; A/C.2 F. Tootle, 625665; Sgt. R. F. Vickery, 530080; L.A/C. A. E. Waddington, 638743; Sgt. L. C. Wakeling, 740420; P/O. P. V. Watson, 41637; F/O. R. F. Weatherill, 77993; Sgt. F. A. Woodcock, 564824.

PREVIOUSLY REPORTED "MISSING," BELIEVED KILLED IN ACTION "NOW REPORTED "KILLED IN ACTION."—Sgt. F. J. Keast, 801399.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "KILLED IN ACTION."—Sgt. I. S. Macaulay, 747942.

WOUNDED OR INJURED IN ACTION.—Sgt. J. W. H. Brown, 747774; F/O. C. M. Clementi, 72465; P/O. W. K. Davison, 73728; F/O. J. F. Evans, 40686; Sgt. D. H. Gower, 755273; Sgt. A. McG. Grant, 742551; Sgt. D. S. Gregory, 565558; Sgt. A. E. Harrison, 641056; Sgt. C. Hendy, 908494; Sgt. J. Hill, 905444; Sgt. W. T. W. Large, 748145; Sgt. G. T. Lea, 942314; F/O. S. Linnard, 40179; Act. Sqn. Ldr. A. E. Rogenhagen, 15025; Sgt. E. W. Sponder, 751927; F/O. D. A. Stewart, 41220; Sgt. G. R. Thistle, 539346.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. S. G. Cooper, 42301; Sgt. F. Goulding, 537868; Sqn. Ldr. W. J. Hickey, 32035; P/O. G. H. Holmes, D.F.M., 84682; Sgt. W. Riley, 966315.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. Crawford, 648647; Sgt. A. M. Goldfeather, 747841; Sgt. H. E. Postill, 546900.

MISSING.—A/C.1 J. S. Audsley, 640551; Flt. Lt. M. R. Baillon, 37147; Sgt. E. H. Battle, 523469; Sgt. J. S. Beattie, 910397; Sgt. W. R. N. Beavers, 631456; Flt. Lt. R. S. Blake, 37274; Sgt. R. A. Bradshaw, 905929; Sgt. D. R. Briggs, 580535; Sgt. B. A. C. Brooker, 616564; Sgt. F. T. Buckingham, 758023; Sgt. G. E. Bygrave, 532192; Sgt. W. E. Callaghan, 623929; Flt. Lt. H. D. Card, 37934; Sgt. W. Chambers, 745628; Sgt. H. J. Clarke, 754445; Sgt. L. E. Crawshaw, 751624; F/O. D. A. Daiswell, 40367; F/O. I. H. Dolman, 41264; Sgt. B. Drake, 581325; Sgt. W. M. Eaton, 619088; Sgt. R. J. Farthing, 564639; Flt. Lt. D. V. W. Francis, 37165; F/O. V. T. H. Frith, 40467; Sgt. J. C. Hall, 652398; Sgt. C. J. Haun, 580541; P/O. G. H. Hannan, 79237; Sgt. M. J. O. Heaney, 970881; Sgt. M. Hemingway, 649426; Sgt. R. F. Henry, 627041; P/O. R. T. Hewer, 86424; L.A/C. J. G. Hoffen, 537498; Sgt. B. T. Hopkins, 516354; Sgt. J. F. Huxtable, 901860; Sgt. W. H. James, 972478; L.A/C. T. A. Kennedy, 521902; Sgt. E. C. Lee, 969132; Sgt. W. R. J. Little, 539889; Sgt. G. H. Lyle, 550312; Sgt. E. M. W. McKim, 580620; Sgt. J. C. Macaskie, 936778; Sgt. W. B. Miffin, 550750; F/O. P. F. Miles, 74338; Sgt. P. Milligan, 629402; Sgt. F. G. Moir, 755242; Sqn. Ldr. G. W. Montagu, 26241; Sgt. R. F. Murray, 751547; Sgt. D. Ogston, 817057; Sgt. F. Pease, 564298; Flt. Lt. J. E. Pebody, A.F.C., 36105; Sgt. A. K. Perkins, 649616; Sgt. W. S. Plant, 620004; Sgt. C. D. Powrie, 745352; Sgt. J. L. Rees, 751429; Sgt. H. R. Richardson, 526112; Flt. Lt. J. A. Richardson, 37576; Sgt. E. S. Rimes, 624959; Sgt. C. C. I. Roberts, 968757; P/O. P. G. H. Salmon, 41071; Sgt. A. L. Sargeant, 528626; Act. Flt. Lt. A. T. N. Scotlock, 70608; Sgt. B. Sheldrick, 639947; Sgt. D. G. Shepherd, 625253; Sgt. C. E. R. Sidebotham



OVER THE STICKS: Sqn. Ldr. D. O. Finlay, seven times winner of A.A.A. 120 yards hurdles, and pilot of the Spitfire subscribed for by the Observer Corps.

740141; Sgt. G. G. Smith, 615035; Sgt. J. H. Tiedman, 755441; P/O. J. H. D. Tilson, 42030; Sgt. C. M. Tiplady, 745261; Sgt. J. W. Unett, 638891; P/O. N. H. Webb, 44594; Sgt. J. C. Wild, 751569; Sgt. G. M. Willcox, 755151; Sgt. A. M. Wood, 817163; Sgt. C. E. R. Yard, 754799; Sgt. R. W. Yarwood, 755720; Sgt. C. F. Young, 638694.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE (WHILE ENGAGED IN NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—P/O. H. E. Hooker, 85920.

KILLED ON ACTIVE SERVICE.—Sgt. L. J. Alesbury, 625037; L.A./C. V. F. le F. Allen, 1259510; F/O. P. A. S. Baker, 40791; F/O. J. R. Bellerby, 41652; L.A./C. A. M. P. Bickford, 919448; P/O. T. Birket, 87634; Sgt. J. Blatchford, 745212; L.A./C. L. S. J. Bright, 653093; A/C.2 C. S. J. Brooks, 1175932; Sgt. C. D. Busbell, 745584; Sgt. J. A. Carroll, 942329; L.A./C. E. E. D. Clarke, 1251069; Flt. Lt. F. E. H. Cooper, 34001; A/C.2 R. Coulson, 640581; A/C.1 N. J. Cross, 629121; Sgt. D. J. Davey, 553939; P/O. J. D. Dodd, 84522; A/C.2 I. D. Dodwell, 1268098; P/O. K. W. Edwards, 85285; Sgt. S. Evans, 654511; A/C.1 G. H. Fairclough, 632511; Cpl. A. J. Gleeson, 840509; P/O. A. W. Grant, 86735; A/C.2 J. Grant, 1009370; L.A./C. A. E. Hall, 961773; Sgt. J. S. Hamilton, 754020; Sgt. E. L. Hancock, 935217; A/C.2 F. A. Hanlon, 1359002; Act. P/O. J. C. L. Hamner-Strudwick, 82218; P/O. D. R. F. Havilland, 87045; A/C.2 J. I. Henderson, 1379801; L.A./C. J. McC. Hicks, 924144; Act. P/O. J. H. Hoare-Scott, 87673; P/O. H. H. J. Hobday, 82198; Sgt. A. Hook, 647887; L.A./C. A. G. Howse, 1152078; P/O. M. Hubbard, 83259; Sgt. E. Jones, 523574; A/C.1 S. Julian, 636478; P/O. W. E. Lacey, 82192; P/O. P. H. Leckrone, 84665; C. G. M. Leslie, 100268; Sgt. R. S. W. Lloyd, 742839; Sgt. C. Malcolm, 805031; P/O. K. J. Marston, 83715; Sgt. C. G. Matthews, 755027; Sgt. J. H. May, 759356; A/C.1 G. W. Moors, 907460; A/C.1 A. E. H. Moore, 634717; A/C.2 R. E. Moore, 1310173; A/C.2 N. Morton, 1379786; A/C.2 J. O. Paul, 634836; P/O. A. F. Pennymore, 87353; Sgt. K. W. B. Perkins, 590585; P/O. A. H. Pettitt, 85011; Sgt. D. S. Roberts, 818085; Act. Flt. Lt. R. J. S. Rust, D.F.C., 215133; P/O. A. M. W. Scott, 76023; L.A./C. J. K. Sewell, 1183317; Sgt. R. A. Shaves, 934004; L.A./C. F. W. Shearmur, 915704; Sgt. B. Q. Sheppard, 910413; Sgt. D. W. Smith, 648240; L.A./C. J. C. D. Spurgin, 1058860; L.A./C. R. McL. Steven, 964226; P/O. R. C. Stokes, 80862; Sgt. S. Stokoe, 754855; Flt. Sgt. W. A. Sutcliffe, 565303; Act. Wing Cdr. A. W. Sweeney, 32132; L.A./C. R. N. Tait, 1165236; F/O. H. W. Tennant, 37431; Sgt. H. W. Walmsley, 755997; F/O. F. A. Walton, 40869; P/O. E. N. Ward, 81340; A/C.1 E. E. Ward-Purkis, 846373; Sgt. I. W. Watkins, 979229; Sgt. B. C. Webber, 754818; Sgt. A. A. Wilsdon, 510613; Sgt. J. McE. Wright, 754656.

PREVIOUSLY REPORTED "MISSING, BELIEVED KILLED ON ACTIVE SERVICE." NOW PRESUMED "KILLED ON ACTIVE SERVICE."—P/O. F. E. Byerley, 77469; F/O. G. H. Stephens, 37895.

PREVIOUSLY "MISSING, BELIEVED KILLED IN ACTION." NOW REPORTED "KILLED ON ACTIVE SERVICE."—Sgt. D. V. Hayter, 745222.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Act. P/O. W. N. Basson, 78539; A/C.2 S. W. Darvall, 1306473; L.A./C. F. Davies, 965917; A/C.2 K. W. Dingwall, 617469; L.A./C. R. W. Greenwood, 907094; A/C.1 T. J. Herlihy, 541190; Sgt. J. E. Hodges, 968593; A/C.1 H. H. Madeley, 919815; Flt. Lt. R. C. Pressland, 70553; L.A./C. G. Thomas, 929131; Act. F/O. D. A. White, 42927; L.A./C. R. J. White, 931493.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.1 L. H. Allinson, 644929; P/O. A. R. Goode, 86692; L.A./C. H. H. Joseph, 956834.

PREVIOUSLY REPORTED "WOUNDED OR INJURED ON ACTIVE SERVICE." NOW REPORTED "DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE."—Cpl. A. P. Gowers, 844507.

DIED ON ACTIVE SERVICE.—A/C.2 J. E. D.

Adams, 1168629; A/C.2 W. E. Atherall, 870911; A/C.2 R. W. Baker, 1295188; Cpl. R. C. Barr, 541462; A/C.1 G. C. Cooke, 944038; Act. Sgt. A. K. Dacre, 997210; A/C.1 A. Davies, 983340; L.A./C. L. T. M. Davies, 640362; A/C.1 H. Dawson, 929296; A/C.2 J. S. Debenham, 623688; Grp. Capt. J. A. G. De Courcy, M.C.; A/C.2 C. A. Fordham, 1197719; A/C.2 E. Goulburn, 1066110; A/C.2 A. Howarth, 1009174; L.A./C. C. E. Lyon, 814149; A/C.2 R. Ord, 1002950; Flt. Sgt. T. O. Scully, 522981; A/C.1 F. W. Stevens, 943043; P/O. J. R. M. Stewart, 40573; A/C.2 B. J. Trewin, 932348; A/C.1 S. C. Upham, 865247.

PREVIOUSLY REPORTED "MISSING," NOW REPORTED "PRISONER OF WAR."—L.A./C. J. A. Dixon, 820009; A/C.2 J. K. Thompson, 614956.

Royal Canadian Air Force

MISSING.—P/O. L. S. Hill, J.2823.

Royal New Zealand Air Force

MISSING.—Sgt. H. M. English, A.391878; Sgt. A. H. Ritchie, A.4027; Sgt. N. E. Thompson, N.Z.40926.

KILLED ON ACTIVE SERVICE.—Sgt. E. G. Peters, A.401519 P/O. V. S. Reynolds.

Amendment to Casualty Communique No. 56. **PREVIOUSLY REPORTED "MISSING," NOW PRESUMED "KILLED IN ACTION."**—For P/O. D. J. T. Lusk, 70413, read F/O. D. J. T. Luck, 70413.

Prisoners of War

NEXT of kin, if able to identify the men from the information published, are requested to advise the Casualty Branches of the Services concerned, forwarding Regimental or any other details.

The following is the latest list of British prisoners of war as received from enemy sources:—

In German Hands

P/O. D. B. Ainsworth, York Road, New Southgate, London; Sqn. Ldr. M. L. McCollm, c/o Air Ministry, London, Service No. 70419; Sgt. H. M. English, Hastings, New Zealand; Sgt. E. K. Shuter, 1, Rushington Lane, Southampton; Sgt. L. A. Beckett, 33, York Road, Reading; Sgt. A. Donaldson (wounded), Ridley Street, 72, Sunderland; Sgt. C. Stock (wounded), address unknown; Sgt. E. Wallace (wounded), 55, Midsley Street, Birmingham; P/O. R. G. Stark, Albany Street, Dunedin, New Zealand; P/O. H. D. Newman, Lechnon Street, Timaru, New Zealand; Sgt. M. O. Fenn, Waterloo, Banwell High Street, Banwell, Somerset; Sgt. S. L. Spittell, Malvern Road, Thornton Heath, Surrey.

Sgt. A. Hamilton, Hastie, Hamilton Drive, Cambsburg, Lanarkshire, Scotland; Sgt. C. A. Ayres, Park View, Northern Parade, North End, Portsmouth; P/O. J. B. T. Loudon, Lygon Road, Edinburgh; Sgt. E. W. Wilmore, Ombersley Road, Worcester.

Sgt. D. G. B. Protheroe, Libuka Harpi, Tonga, Friendly Islands (taken phonetically).
Sgt. H. Garratt (?Garrien), address unknown, wounded and in hospital.

London Gazette

Royal Air Force

General Duties Branch

Flt. Lt. (temp. Sq. Ldr.) S. R. R. Smith, is granted a permanent commission in the substantive rank of Flight Lieutenant. Oct. 19, 1940.

The undermentioned are granted temporary commissions as Pilot Officers on being employed with the Royal Air Force:—(Nov. 27, 1940) J. L. Martin, Capt., R.A. (T.A.); J. S. Heath, Lt., R.A. (T.A.); G. Whitaker, 2nd Lt., K.O.Y.L.I. (T.A.);

A. P. L. Barber, 2nd Lt., R.A. (T.A.); J. E. Heaton, 2nd Lt., R.A. (T.A.); P. M. Hackett, 2nd Lt., Manch. R. (T.A.); F. W. Harries, 2nd Lt., Devon R.; J. Evans, 2nd Lt., R. Tank R. (T.A.); E. G. Mounsey, 2nd Lt., R.E. (S.R.); R. Rimmer, 2nd Lt., King's Own R.; D. Constant, 2nd Lt., R.A.C. (T.A.); G. W. Cole, 2nd Lt., R.E.; S. D. Jones, 2nd Lt., Wore. R. (T.A.); L. J. Peatridge, Lt., R.A. (T.A.); (Dec. 4, 1940) G. R. Owens, Lt., R.E. (T.A.); J. Stewart, Lt., R.E. (T.A.); J. H. Eastwood, Capt., R.A.S.C. (T.A.); G. L. Huntley, 2nd Lt., R.E. (T.A.); G. D. Leyland, 2nd Lt., K.R.R.C. (T.A.); T. R. L. Waring, 2nd Lt., R.E. (T.A.); P. R. E. Jenkins, 2nd Lt., The Queen's R.; C. D. N. Lewis, 2nd Lt., K.R.R.C. (T.A.); J. G. A. Ellis, Lt., Gloster R. (T.A.).

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Flight Sergeant:—(Dec. 16, 1940) H. Baker, Sergeant:—(Dec. 16, 1940, Sen. Aug. 14, 1940) E. L. Bloxham.

P.O. on probation M. M. Stephens, D.F.C., is confirmed in his appointment. Dec. 23, 1940.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Dec. 10, 1940) G. J. Stonhill; (Dec. 24, 1940) D. A. Fordham, D.F.C.; S. B. Bintley; (Dec. 31, 1940) G. D. Hill, J. C. Mungo-Park, D.F.C.

The undermentioned Pilot Officers are promoted to the rank of Flying Officer on dates stated:—(Sept. 3, 1940) R. B. Barr; (Oct. 2, 1940) J. S. Hart; (Nov. 8, 1940) A. H. Corkett, E. H. King, J. B. Latta, D.F.C., J. F. J. Macphail, L. J. B. Truscott, R. W. Ayres, D.F.C., E. G. Biddood, W. R. Corkhill, P. W. Arbon, K. S. Dewhurst, R. F. T. Doe, D.F.C., A. F. Hovenier, J. Humphreys, E. B. Mortimer-Rose, M. K. Brown, K. T. Hannah, P. W. Horton, K. A. Lawrence, E. H. McHardy, J. H. Tavenor, G. G. A. Davies, P. E. A. Lost, H. K. Mitchell, C. B. G. Peachment, S. T. Beal, A. E. Hill, R. J. P. Barber; (Nov. 18, 1940) D. Bayliss, A. J. Strachan; (Dec. 9, 1940) A. G. W. Hough.

Sq. Ldr. C. A. Bell is transferred to the Technical Branch, April 24, 1940.

Gr. Capt. A. G. Board, C.M.G., D.S.O., reverts to the retired list Feb. 14th, 1941, and resumes with effect from that date the rank of Air Commodore (Sen. Jan. 1, 1928).

Act. Vice-Marshal C. T. MacLean, C.B., D.S.O., M.C., is placed on the retired list. Dec. 27, 1940. P.O. J. D. Richards (Lt., R. Sussex R.) relinquishes his temporary commission on return to Army duty. Dec. 6, 1940.

Technical Branch

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Warrant Officers: (Dec. 18, 1940) W. T. Soady; (Dec. 20, 1940) E. Easton. Flight Sergeant: (Dec. 10, 1940) A. Wood.

Sq. Ldr. C. A. Bell is promoted to the rank of Wing Commander (temp.). June 1, 1940.

Administrative and Special Duties Branch

The undermentioned are granted commissions for the duration of hostilities:—As Flying Officers on probation:—Warrant Officers: (Aug. 23, 1940) E. G. Hollis; (Dec. 19, 1940) P. Macario; (Dec. 23, 1940) W. H. B. Horne. As Pilot Officers on probation:—Flight Sergeant: (Dec. 2, 1940) E. J. Brandon. Sergeant: (Dec. 9, 1940) S. J. Davies.

Equipment Branch

The undermentioned are granted commissions for the duration of hostilities (Dec. 6, 1940):—As Pilot Officer on probation:—Warrant Officer: E. V. Blazey. As Acting Pilot Officers on probation:—Flight Sergeant: K. G. Baker. Corporal: P. G. Tilbrook.

Accountant Branch

P/O. on probation H. H. Jackson is confirmed in his appointment July 29, 1940, and promoted to the rank of Flying Officer (Sept. 13, 1940). The undermentioned Acting Pilot Officers on



MISS OTIS REGRETS: A member of the W.R.N.S. delivers a message to a Skua pilot.

SERVICE AVIATION (Continued)

probation are graded as Pilot Officers on probation:—(Aug. 10, 1940) J. B. Harrison; (Aug. 11, 1940) W. L. Collis. (Substituted for notifications of Oct. 29, 1940).

Medical Branch.

F/O. R. Napier, M.B., Ch.B., F.R.F.P.S., is promoted to the rank of Flight Lieutenant (Sept. 4, 1940, Sen. Sept. 4, 1939).

Royal Air Force Reserve**RESERVE OF AIR FORCE OFFICERS.****General Duties Branch.**

P/O. H. E. Horne is promoted to the rank of Flying Officer (Sept. 19, 1940).

F/O. R. H. Ball is transferred to the Administrative and Special Duties Branch (Dec. 27, 1940).

The undermentioned relinquish their commissions in class OC on appointment to commissions in the R.A.F.V.R.—(Sept. 1, 1939) F/O. B. E. Druce; (Oct. 1, 1940) Sqn. Ldr. R. Wilson.

Medical Branch.

F/O. J. H. L. Newham, M.R.C.S., L.R.C.P., B.S., is promoted to the rank of Flight Lieutenant (Sept. 23, 1939).

Royal Air Force Volunteer Reserve**General Duties Branch.**

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Sergeants: (Nov. 22, 1940) R. J. Williamson; (Dec. 2, 1940) T. P. Lynch; (Dec. 8, 1940) F. E. Brander; (Dec. 9, 1940) F. L. A. J. (Dec. 17, 1940) N. A. Lawrence. Leading Aircraftmen: (Nov. 17, 1940) P. J. D. Grove; (Nov. 23, 1940) C. C. Brackenbury, G. H. Dean, C. E. O. Hamilton-Williams; (Nov. 24, 1940) W. F. Gibb; (Nov. 25, 1940) A. J. F. Allen-White; (Nov. 30, 1940) A. G. Baring, D. A. Dale, J. P. Dickinson, J. E. Horsfield, A. P. Millar, M. N. F. Jones; (Nov. 30, 1940) G. M. Bussy, J. C. Cunningham, D. S. Fraser, W. Freund, I. S. Jenks; (Dec. 1, 1940) K. P. S. O'Donnell; (Dec. 2, 1940) D. H. H. Gathercole, B. L. G. Hawkins, T. R. Hawthorn, I. M. G. Kennedy, A. V. Maslen, F. J. H. Pain; (Dec. 8, 1940) D. Wisdom; (Dec. 14, 1940) R. G. S. King.

P/O. on probation D. R. Smith-Bingham is confirmed in his appointment (Oct. 20, 1940).

The undermentioned Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer:—(Nov. 8, 1940) C. G. D. Lancaster; (Nov. 13, 1940) W. R. Houston, D. G. Johnson; (Nov. 18, 1940) H. P. D. Sykes; (Nov. 20, 1940) J. Hills; (Nov. 27, 1940) E. W. Bitmead, D.F.C., T. H. Tozer; (Dec. 1, 1940) P. V. Boot, D.F.C.

F/O. J. C. Smyth is promoted to the rank of Flight Lieutenant (Sept. 3, 1940).

P/O. on probation A. R. M. Geddes is confirmed in his appointment (Nov. 9, 1940).

F/O. M. L. Formby is transferred to the Technical Branch (Oct. 2, 1940).

Ft. Lt. A. E. S. Scott relinquishes his honorary commission on cessation of duty (Feb. 4, 1940).

The commissions of the undermentioned Pilot Officers on probation are terminated on cessation of duty:—(Dec. 9, 1940) C. A. Bell; (Dec. 22, 1940) M. A. Williams.

Ft. Lt. J. S. Harrison is cashiered by sentence of General Court Martial (Dec. 26, 1940).

Erratum.

In notification of Apr. 9, 1940, concerning H. C. F. Barran. For Barran read Barham.

Technical Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation (Dec. 1, 1940):—R. G. Enticknap, R. Fennessy, R. A. Harker, J. B. Heard, C. L. Lacey, C. W. Palmer, K. W. Pearson, E. W. Seward, A. F. Shaw.

Balloon Branch.

The undermentioned are granted commissions for the duration of hostilities as Pilot Officers on probation:—Corporals: (Dec. 4, 1940) S. D. Butler; (Nov. 26, 1940) W. Pritchard; (Dec. 4, 1940) A. R. S. Stockdale. Aircraftman 1st Class: (Dec. 10, 1940) M. H. Farthing.

P/O. on probation F. J. Ainge is confirmed in his appointment (Sept. 28, 1940).

P/O. on probation J. Molesworth-St. Aubyn is confirmed in his appointment Sept. 15, 1940, and promoted to the rank of Flying Officer (Sept. 21, 1940).

P/O. on probation J. G. Merchant is confirmed in his appointment and promoted to the rank of Flying Officer (Dec. 14, 1940).

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation (Dec. 1, 1940):—K. G. Roost, M. G. Kirke, R. McSweeney.

Administrative and Special Duties Branch.

The undermentioned are granted commissions as Flight Lieutenants:—(Sept. 1, 1939) Lieut. Cdr. B. E. Druce, R.N.R.; (Oct. 1, 1940) Capt. R. Wilson, S.U.L.I.A.

The undermentioned are granted commissions for the duration of hostilities:—As Flying Officer: (Dec. 4, 1940) A. J. Hill. As Pilot Officers on probation: (June 17, 1940) C. G. C. G. Kuhle; (July 6, 1940) F. W. Evans, F. H. Hayley-Bell, D.S.O.; (Sept. 26, 1940) J. C. Leech; (Sept. 27, 1940) B. H. Morgans (Substituted for notification of Nov. 5, 1940, concerning this officer); (Sept. 30, 1940) E. W. H. White; (Oct. 9, 1940) H. N. Thomas; (Oct. 12, 1940) C. N. Edwards; (Oct. 22, 1940) L. B. Hore, D. D. McMahon; (Oct. 28, 1940) G. E. A. Greensill; (Nov. 1, 1940) H. Ross; (Nov. 4, 1940) E. A. McGeachy; (Nov. 5, 1940) S. R. Jeffreys; (Nov. 15, 1940) J. E. F. Walsh; (Nov. 20, 1940) C. D. Kirkbride; (Nov. 23, 1940) W. H. Campbell; (Nov. 24, 1940) H. Dillon; (Dec. 1, 1940) W. S. Ball, B. F. Blumemore;

(Dec. 2, 1940) S. C. Thornley; (Dec. 5, 1940) A. L. W. R. Henry, L. G. Honisett, A. T. Pilley, J. R. Robinson, F. M. R. F. Sander, S. E. Betesh; (Dec. 6, 1940) L. W. Andreae, E. Baird, C. L. Ballantine, C. J. Bass, C. Bayly, F. C. Bennett, H. J. M. Berthon, H. C. Brett, R. L. Broad, O. R. Brown, B. Cane, P. W. Charles, I. Costie, J. A. Cracknell, E. A. Devine, L. H. Eberli, J. L. T. Evans, H. C. Freeth, R. G. Gilbert, D. R. Griffiths, W. E. Griggs, E. H. Harvey-George, F. D. C. Henry, D. S. E. Herriage, P. Honey, M.M., E. J. Kelland-Espinosa, A. S. Kelly, L. W. Luce, A. R. Magary, A. Nevitt, J. P. Noble, J. F. Page, A. D. Rae, E. S. Rawson, M.C., H. S. Rowsell, T. G. Sheriff, B. C. Sparrowe, C. S. G. Stott, H. C. B. Sutton, H. J. Thompson, H. W. Turton, E. L. V. Waddilove, H. L. Waddington, G. Walton, F. C. Wilson, J. J. Baker, H. H. Botting, J. A. MacLean, P. H. Ponting; (Dec. 8, 1940) F. C. Bossard, N. C. Cordingly, C. H. Frampton, P. Higgs, F. J. Harris, G. P. Kendall, L. W. Meyer, E. S. Sherwell, P. H. Taylor; (Dec. 10, 1940) K. C. Brown; (Dec. 11, 1940) F. A. Allicott, F. Blenkiron, J. W. Ware; (Dec. 12, 1940) H. A. Coysch, C. B. Edwards, H. L. R. Morgan, E. P. W. Robins, T. MacD. Stewart, A. G. Waller, F. D. Wilton; (Dec. 14, 1940) L. E. B. Austin, S. J. Busby, R. H. Butcher, H. A. R. Campbell, A. C. L. Davis, W. J. Emanuel, J. F. Norbury, J. F. Payne, G. M. H. Peck, J. B. Rogers, K. J. Skeet, H. C. Turner, E. A. Vaughan, D. Williams; (Dec. 16, 1940) L. A. Clark, A. A. Willis; (Dec. 17, 1940) S. A. Worth, Sergeant; (Dec. 14, 1940) F. T. Gibson. K. J. Dear is granted an Hon. Commission as Flight Lieutenant (Dec. 23, 1940).

The undermentioned Pilot Officers on probation are confirmed in their appointments:—(Aug. 1, 1940) J. L. Fowke; (Sept. 26, 1940) S. L. Bennett, C. N. B. Crisp, D. W. Donaldson, T. Dootson, J. O. Durham, T. H. Seymour; (Oct. 20, 1940) H. Coverdale; (Nov. 14, 1940) H. E. Faulkner; (Nov. 20, 1940) J. B. R. Ellison, R. H. Deighton; (Nov. 23, 1940) W. T. Smith; (Nov. 25, 1940) J. Duncan; (Nov. 26, 1940) G. B. Atkinson; (Dec. 1, 1940) R. Bond.

The undermentioned Pilot Officers on probation are confirmed in their appointments and promoted to the rank of Flying Officer:—(Sept. 19, 1940) E. J. Munson; (Sept. 26, 1940) C. G. Allman; (Nov. 14, 1940) H. G. Kirk; (Nov. 29, 1940) H. Watkins.

The undermentioned Act. Pilot Officers on probation are graded as Pilot Officers on probation:—(Sept. 19, 1940) E. E. Dowling; (Oct. 12, 1940) E. L. Hartman.

P/O. on probation N. R. Dobrée is transferred to the General Duties Branch (July 29, 1940).

The undermentioned are transferred to the Technical Branch. Flight Lieutenant: (April 24, 1940) H. Buxton. Flying Officers: (April 24, 1940) E. I. David, E. C. Hucklebridge, A. C. T. Isaac, R. E. Le Lacheur, J. McLennan. Pilot Officers on probation: (April 24, 1940) J. Armes, A. M. de Hauteville Bell; (July 25, 1940) H. E. G. Richards; (Aug. 14, 1940) R. Dick-Larkam; (Sept. 9, 1940) C. T. Chapman, J. D. Atcherley, S. Gifford; (Sept. 18, 1940) E. L. T. Barton; (Sept. 20, 1940) J. Bamford; (Oct. 7, 1940) J. H. Emmerson; (Oct. 17, 1940) R. A. C. Sumner.

P/O. on probation J. C. G. Burge is transferred to the Legal Branch, on probation, and is granted the rank of Flight Lieutenant (Dec. 9, 1940).

The undermentioned resign their commissions:—(Dec. 21, 1940) P/O. on probation G. Alchin; (Dec. 29, 1940) P/O. J. Meredith.

The undermentioned relinquish their Hon. Commissions:—(Dec. 16, 1940) Hon. Sqn. Ldr. T. W. Jones. Hon. Flying Officers: G. T. Toon, E. F. C. Stanford, W. B. Hunt, S. C. Ginn, A. R. Dudgeon.

The commissions of the undermentioned Pilot Officers on probation are terminated on cessation of duty:—(Dec. 17, 1940) V. Tansley; (Dec. 21, 1940) A. C. Stacey; (Dec. 22, 1940) F. H. A. Hendry.

Equipment Branch.

The undermentioned are granted commissions for the duration of hostilities as Act. Pilot Officers on probation:—(Dec. 6, 1940) E. J. Bindloss, J. Freeman, E. Graham, F. C. Harrison, N. D. Hart, N. B. Inman, J. Macfarlane, J. R. Macgregor, W. H. R. O'Grady, N. J. Orchard, A. T. Owens, N. W. Pendleton, W. H. Salmond, R. A. Sandison, P. H. F. Tebbutt, E. R. M. Townsend, J. C. Woolard. Leading Aircraftmen: C. G. Dexter, A. C. Morris, T. G. O'Neill. Aircraftmen 2nd Class: F. W. A. Cunningham, E. H. C. Johnson, J. A. Lawson.

P/O. on probation S. G. Jenkins is confirmed in his appointment Sept. 9, 1940, and promoted to the rank of Flying Officer (Nov. 23, 1940).

The undermentioned Pilot Officers on probation are confirmed in their appointments from Sept. 18, 1940, and promoted to the rank of Flying Officer: (Nov. 19, 1940) A. R. Blunsdon, T. H. McCarthy, J. B. Stone, L. A. Taylor.

P/O. on probation W. R. E. Hartley-Urquhart relinquishes his commission on account of ill health (Jan. 3).

Accountant Branch.

Ft. Lt. J. G. Derry relinquishes his commission on cessation of duty (Jan. 5).

The undermentioned Pilot Officers on probation are confirmed in their appointments Oct. 9, 1940, and promoted to the rank of Flying Officer:—(Nov. 26, 1940) H. R. Edwards, S. F. Fernor, L. O. Hart, D. A. R. Kemp.

The undermentioned Acting Pilot Officers on probation are graded as Pilot Officers on probation:—(July 18, 1940) A. R. Wesley (substituted for notification of Oct. 22, 1940); (July 20, 1940) G. M. D. Drummond, A. E. Brown, J. M. Bailey, R. W. Goodburn (substituted for notifications of Oct. 22, 1940); (Aug. 10, 1940) C. H. Adams (substituted for notification of Nov. 19, 1940); K. V. Moss, G. Ruthven (substituted for notifications of Oct. 29, 1940); M. J. McRobert; (Aug. 12, 1940) G. C. Millichamp, S. Beaumont-Smith, H. Eason, J. F. Humphreys (substituted for notifications of Oct. 29, 1940); E. Page, A. E. Bouch, G. A. Puzey (substituted for notifications of Nov. 12, 1940).

Medical Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers:—(Dec. 17, 1940) E. E. Bowen, L.M.S.A., D. I. Buchanan, M.B., Ch.B., C. W. D. Cole, M.R.C.S., L.R.C.P., N. Duguid, M.B., Ch.B., N. G. Farrell, M.B., B.Ch., J. Fiddes, M.B., Ch.B., D.C.H., F. E. Fletcher, M.B., Ch.B., M.R.C.S., L.R.C.P., D. M. I. Freeman, M.B., Ch.B., M.R.C.S., L.R.C.P., H. O. Hughes, M.R.C.S., L.R.C.P., R. K. McElderry, M.B., B.Ch., A. G. Spencer, M.R.C.S., L.R.C.P.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept. 25, 1940) R. Carpenter, M.R.C.S., L.R.C.P.; (Oct. 2, 1940) J. H. McElney, M.B., Ch.B., D.T.M., P. Griffiths, M.R.C.S., L.R.C.P.; (Nov. 14, 1940) G. L. Gysperdt, M.R.C.S., L.R.C.P.; (Nov. 27, 1940) A. Caplan, M.R.C.S., L.R.C.P.; (Dec. 12, 1940) J. Watkins-Pitchford, M.B., B.S., M.R.C.S., L.R.C.P.

Dental Branch.

The undermentioned are granted commissions for the duration of hostilities as Flying Officers:—(Dec. 17, 1940) W. D. Aitken, L.D.S., F. A. Clements, L.D.S., W. E. Howitt, L.D.S., L. S. Lyons, L.D.S., R. E. Q. Mallett, L.D.S., F. E. Smith, L.D.S., G. W. Sutherland, L.D.S.

The undermentioned Flying Officers are promoted to the rank of Flight Lieutenant:—(Sept. 22, 1940) E. E. Frankenburg, L.D.S.; (Sept. 29, 1940) H. W. Hargus, B.D.S., D.D.S.; (Oct. 9, 1940) R. R. Palmer, L.D.S.; (Oct. 16, 1940) E. H. Thompson, L.D.S.; (Oct. 19, 1940) H. F. Caudwell, L.D.S.; (Oct. 23, 1940) M. R. C. Kemp, L.D.S.; (Oct. 25, 1940) W. O. Merker, L.D.S.; (Oct. 31, 1940) W. K. Batten, L.D.S.; (Nov. 21, 1940) F. P. Alford, L.D.S., D.D.S.; D. W. MacFarlane, L.D.S.; (Nov. 28, 1940) J. M. Ross, L.D.S.

Auxiliary Air Force**General Duties Branch.**

P/O. C. D. Newman is transferred to the Technical Branch (Oct. 28, 1940).

Balloon Branch.

P/O. C. B. North is promoted to the rank of Flying Officer (Oct. 17, 1940).

Medical Branch.

F/O. C. Roff, M.B., Ch.B., is promoted to the rank of Flight Lieutenant (Aug. 24, 1940).

Women's Auxiliary Air Force

The undermentioned are appointed Assistant Section Officers:—(Dec. 19, 1940) A/CW.2 Miss C. Babington Smith, A/CW.1 Miss J. L. Bird, Cpl. Miss B. L. Holdsworth, A/CW.1 Miss E. F. Holaday, A/CW.2 Miss A. McKnight-Kauffman; (Dec. 28, 1940) A/CW.2 Miss E. S. J. Coats, A/CW.2 Miss P. F. M. Darby, A/CW.2 Miss J. W. Fowler, A/CW.1 Miss N. C. Gardner, A/CW.2 Mrs. K. T. Goodden, A/CW.2 Miss P. A. Rickett, A/CW.2 Miss W. M. Rutherford, A/CW.2 Miss M. R. de B. Sherwill, A/CW.2 Miss S. Villiers-Stuart; (Dec. 30, 1940) A/CW.2 Miss F. M. E. Macdonald.



SERVICES RENDERED: P/O. E. J. Clelland, now a prisoner of war in Germany. His mother has received a copy of her son's squadron crest signed by the King. It has been awarded for special service.

THE INDUSTRY

Alvis Record

AT the Alvis general meeting, held on the last day of 1940, Mr. T. G. John, chairman and managing director, was able to announce a net profit for the year of £82,162, which constituted a record for the company.

It was also decided to pay all arrears of dividend on the preference shares and a dividend of 5 per cent. (less tax) on the ordinary shares. A sum of £30,000 put to general reserve brought that account to £145,000.

Fairey Dividend

AT a meeting of the Board of Directors held on Dec. 20 it was recommended that a dividend of 10 per cent. free of tax for the year ending 30th September, 1940, should be paid on 10th January, 1941. The profit shown by the accounts for the year ending 30th September, 1940, after provision for taxation and reserve against investment in Subsidiary Company Avions Fairey S.A. is £209,880 as compared with the profit shown by the accounts for the year ending 30th September, 1939, after provision for taxation, of £248,122.

A New Use for Osira Black Glass Lamps

IN the manufacture of tools and gauges, and for bedding in bearings, a very important process is the final finishing, which is usually accomplished by scraping. To detect high spots it has been a common practice to coat the master surface with jeweller's rouge (raddle) or Prussian blue, the uneven places being revealed by particles adhering after the work had been rubbed on to the plate. This method has never been particularly satisfactory, because not only may irregularities in coating the master plate with Prussian blue give rise to spurious high spots, but they are also very difficult to discern in normal light.

It has been discovered by a Mr. H. G. Griffith, B.A., of Aberdeen University, that the process can be accomplished with increased accuracy and speed, and without strain to the eyes, if the Prussian blue is replaced by a mixture of powdered anthracene in medicinal paraffin oil, and

the work inspected under the rays of an Osira black glass lamp. In these circumstances the high spots fluoresce brilliantly enough to be clearly visible in a normally lighted room, and as the merest trace of anthracene is quite sufficient, this system is more sensitive to detection. After the high spots have been scraped down, the remaining fluorescent material can again be cleaned off with a rag moistened with benzene in preparation for a second test.

The only apparatus required for this procedure, which has been found materially to speed up production of jigs, is a standard 80 watt or 125 watt Osira black glass lamp and choke with a simple concentrating reflector, together with a few pennyworth of anthracene, which can readily be obtained from any manufacturing chemist or laboratory supplier. It will be found to be equally successful for steel, white metal or brass work.

The Osira black glass lamps are a product of G.E.C., Ltd.

100 per cent. E.P.T. Effect

MR. W. HENDERSON-CLELLAND, M.C., chairman of S. Smith and Sons (M.A.), Ltd., announced a net profit of £200,039 for the financial year. Dealing with the effect of the 100 per cent. E.P.T. he said:

"The shareholders will no doubt feel satisfaction that the company is able to contribute so largely not only in the material effort in the production of equipment for the Services but also in the cost of paying for the war.

"At the same time the high level of taxation, particularly of Excess Profits Tax, which has been increased from 60 per cent. to 100 per cent. since I last addressed you, is a source of anxiety to the board in their attempt to combine the possibility of a reasonable return to shareholders with proper safeguards for the future.

"It is not perhaps generally realised that the 'profits' on which taxation is charged are invariably in excess of what a prudent business man can consider as profits, so that when tax is provided for it eats very heavily into what should remain for the strengthening of the business and the remuneration of the shareholder.

"Let me give you an example. It is well known that the Revenue allowance for wear and tear is hopelessly inadequate, based as it usually is on an expected machine-life of two or three times the length which engineers know from experience they may expect. That means that for every £1 we write off as depreciation in excess of the wear and tear allowed by the Revenue we must, in addition, pay tax on £1. With an Excess Profits Tax at 100 per cent. over a standard which is a good way below our best pre-war year, and with income-tax at 8s. 6d. on everything below that standard, this is a hardship."

CHANGE OF NAME

AIRCRAFT COMPONENTS, LTD.—Registered office: Arle Court, Cheltenham. Temporary address: Bedford Hotel, North Promenade, Blackpool. Name changed to Dowty Equipment, Ltd., on November 23, 1940.

INCREASES OF CAPITAL

F. CORLETT & Co., LTD., aircraft manufacturers, etc., 32, Clegg Street, Oldham.—The nominal capital has been increased by the addition of £500 in £1 ordinary shares, beyond the registered capital of £500.

TRADE MARK

We are informed by Messrs. H. M. Hobson (Aircraft and Motor) Components, Limited, that they have been accorded registration of the Trade Mark "Hobson" in respect of "Installations and parts thereof for use in aircraft for controlling the induction pressure of, and fuel mixture supplied to, aircraft engines." The number is 610992, and covers their well-known Master Control Carburettors.

NEW COMPANIES

AIRCRAFT COMPONENTS, LTD.—Private company. Registered December 17. Capital £100 in 100 shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in aircraft component parts, fittings and accessories, etc. The directors are: Ernest H. Cozens, 9, Orchard Way, Cheltenham, solicitor's clerk; Harry F. Midwinter, Crescent Place, Cheltenham, solicitor. Solicitors: Midwinter & Co., Cheltenham. Registered office: Crescent Place, Cheltenham.

PUBLICATIONS RECEIVED

Graphical Treatment of Vibration and Aircraft Engine Dampers, by C. H. Powell; \$7.50, Bookcraft, New York, U.S.A.

Best Flying Stories, edited by Capt. Norman Macmillan; 8s. 6d., Faber and Faber, Ltd., 25, Russell Square, London, W.C.1.



Picking up the anthracene from a surface plate.



The high spots revealed by fluorescence.



ENGLISH WORKMANSHIP

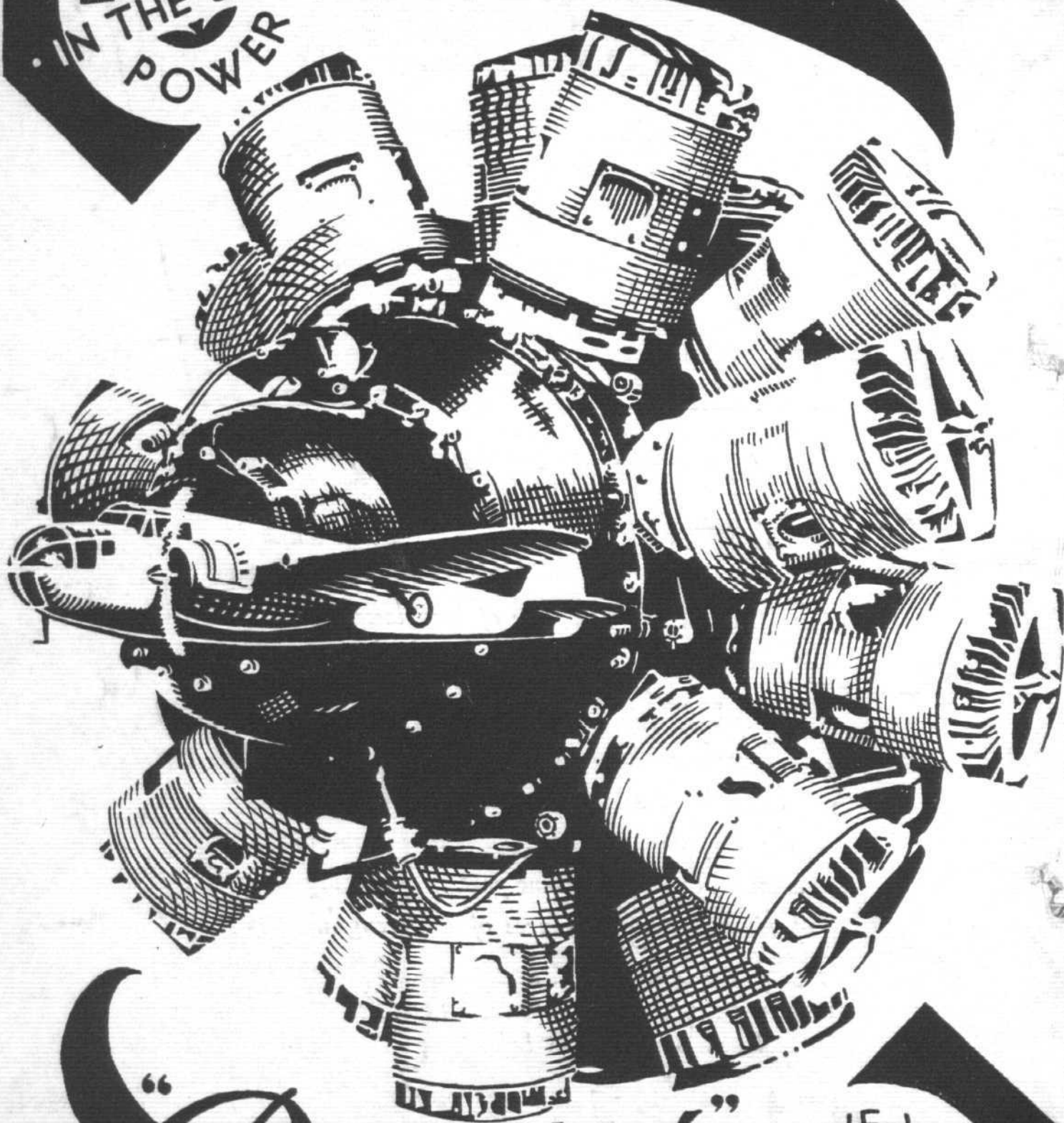
In the fire, the bar of iron loses its bleak rigidity, and the simplest tools then serve to shape and weld it.

But the materials and the methods have their limitations, and these limitations challenge the craftsman, so that he turns them to account, and they become part of the beauty of his work and a source of its strength.

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