A FURTHER THREE YEARS' FLYING EXPERIENCE.*

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THE past three years, although normally a short space of time, yet measured by the advance of aviation, has been a veritable lifetime.

I think I am right in saying that through the war aviation has advanced more than it would have done in eight or ten years of peace conditions. In fact, the rate of improvement in aircraft is so fast, the pace so alarmingly rapid, that it is almost impossible for manufacturers to keep pace, for it seems that by the time the latest and most efficient type of machine is manufactured in sufficiently large numbers to gratify half the requirements of the Services, that type is out of date and obsolete.

A pilot has only to take a short flight on a 1914-type machine and then fly the latest 1917 pattern as a comparison to really appreciate this colossal advance.

Some little time ago I had occasion to again fly, after a considerable lapse of time, a 50 h.p. Gnome-Blériot, a one time premier machine—in fact, a type used quite a lot by ourselves and the French at the very beginning of the war. At first I believed the machine to be a very bad specimen of the species, but ultimately, after flying it for some time and acquiring a sort of lost art of balance, like a skater who has not skated on ice for years and has to get his legs again, I realised that it was quite a good specimen of the type, but that it takes quite a time to again get used to such inefficiency. The advance seems to have been along, one might say, quite conventional lines, that is, improvements on what might be accepted as standard designs, and no good results have been obtained from any departure from that standard. Perhaps the furthermost departure from what I call standard—and that is very slight—has been the triplane. The results obtained with the quadroplane have not justified the experiment.

During the past three years the first marked improvement, to my mind, which asserted itself was the inherently stable machine, attained apparently by such slight detail alterations as sections of planes and elevators that it required an experienced eye to detect a stable or unstable aeroplane by casual inspection when standing together. Then came the synchronised timing gun-gear, which enabled the machine guns to be fired through the propeller on tractor machines. This device is really so simple that one is at a loss to understand why it had remained so long undiscovered. It had the effect of giving the tractor type of machine a new lease of life. Although a more efficient type aerodynamically than the pusher, it had been falling into disfavour as a fighter on account of the inability of the pilot to shoot straight ahead of the machine. Improvements in engines, to my mind, are responsible for present-day performances to a far greater extent than improvements in machines, chiefly through sheer increase of horse-power, as my diagram shows. And cases have occurred where certain obsolete types have been made serviceable simply by fitting an improved type of engine. The improvements in the machines themselves seem to have been limited to details such as wing sections, attention to head resistance, soundness of construction, &c. The very efficient freak machine has yet to make its appearance. I will not attempt to discuss the future of aviation, but setting aside the boundless commercial possibilities, I am more and more convinced that if we find it necessary to keep up an enormous Navy, say, a two-Power standard, to protect our island, it will be essential to maintain at least the same standard in the air. That in itself guarantees a colossal future for aeronautics.

Difference in Machines.

I have flown many different types of aeroplanes, and, considering the extraordinary variations in the types, the difference in the actual piloting of any modern machine, to my mind, is remarkably small. I am of the opinion that a pilot who is thoroughly efficient with any particular type will, in a very short time, be master of any. I find that on stepping out of a very fast small scout into a really big twin-engine machine the difference in the manner of piloting is very slight compared with the vast difference in the machines. Precisely the same methods are employed, the same trouble and risks are to be avoided. The chief characteristics seem to be that the smaller and faster machines are more difficult to land, but are easier to handle in the air. In the case of "crashes," the larger and heavier the aeroplane the less damage there is likely to occur to the occupants, as a tremendous amount of the impact is absorbed by the machine. Very much larger and heavier machines than those at present in use might be comfortably flown single-handed, no extra effort being required for the controls, provided the controlling surfaces are properly balanced.

To the lay mind it might appear that with such contrasts in the outward appearance of the smaller and larger machines, that it would be necessary to train pilots specially and extensively for each type, but in my experience this is not so. I certainly think the best results are obtained when pilots are allowed to specialise. This, however, I understand has many drawbacks on active service.

Crashes.

Crashes are mainly due to three causes, viz., engine failure, faulty piloting and faulty machines. Engine failure undoubtedly is responsible for most of the crashes, often because of the hopeless unsuitability of the landing ground at the pilot's disposal. To many pilots engine failure is most disconcerting, and it is then they are called upon to use rather more judgment and skill, so that even with a fairly suitable landing ground available they very often crash. In my experience, embracing the testing of hundreds of new machines, it is seldom that a serious defect in the engine "lets one down"; it is nearly always due to a small detail. I think I have had to make more forced landings through failure of the petrol supply than all the other troubles combined. This is due more often to failure of the pressure feed than to a choke in the supply pipes, and very seldom to severed connections in the feed system.

Because of the absence of a float chamber to the carburettor in the rotary engine, even a variation of the petrol pressure is more serious than in the rigid stationary type. In the former case the amount of petrol that gets to the motor is controlled by the pressure and a fine adjustment. If the pressure increases unduly the motor chokes from over richness of mixture; on the other hand, if the pressure drops away the mixture is unduly weakened. This variation can be controlled by the fine adjustment to a large extent, but when that limit is exceeded the engine will fail. Most of the trouble seems to be caused by failure of the pump, which in some cases forms an integral part of and is driven by the motor; in others it is a separate unit, driven by a small air-screw. These failures are usually through valves sticking up and pistons becoming dry. Other causes of failure are in the relief valve not being pressure tight or sticking down. At any rate, the present system of pressure feed, to my mind, is such a bugbear that it is high time something was substituted. As far as the non-rotary motor is concerned, to my knowledge this matter is being tackled. I have been flying recently a machine fitted with a petrol pump in place of the air pressure pump, the petrol being pumped direct from the main tank to the carburettors, and the surplus is returned to the tank through an adjustable spring-loaded relief valve, so that petrol is delivered at any desired pressure to the engine. So far it has proved most satisfactory, with this advantage, that a punctured tank does not put it out of action. Dirt in the petrol tank accounts for quite a large proportion of engine failures in new machines. This form of trouble ought to be avoided. It is an important matter which manufacturers should be made to recognise, and a very thorough system of tank washing employed before installation in the machines. The dirt in the tank usually takes some time to work its way into and accumulate in the feed pipes or filters sufficiently to choke them. The machines are often by that time being delivered by air by pilots who are none too familiar with them, consequently engine failure means a good chance of crashing.

I remember having four forced landings while delivering a new B.E.2c from Farnborough to Dover on this account. Another simple cause of engine failure which might easily be guarded against is that petrol cocks in many cases have no definite locking device to ensure that they remain in the open position during flight, consequently they are liable to vibrate into the "off" position, thus cutting off suddenly the petrol supply. Many instances have come to my notice where petrol cocks are fitted in such a manner that the tendency is, through the weight of the cock lever, to fall shut instead of the reverse. This is such a simple and yet such an important point, that it really is surprising mistakes like this are continually allowed to be made. I have had engines cut out suddenly on three occasions during the past two months from this cause alone—one meant a forced landing because the petrol cock was not accessible to the pilot, the other two were opened again in the air. It often leads to serious results, as the petrol fails suddenly, and it is seldom that the

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