

These passages in the intake headers are connected by two water outlet headers, the final outlet of which has an outside diameter of 2 in.

The water pump is driven from a vertical shaft which takes its drive from the same vertical shaft that drives the camshaft driveshafts and the generator. This shaft extends downward and has a bevel gear which meshes with a bevel gear on the end of the pump shaft, thus accomplishing the drive. The vertical shaft extends downward and terminates in the oil pump, carrying the driving gear of the gear type of pump utilised for this purpose.

Two duplex Zenith carburettors are used on the 12-cylinder Liberty aircraft engine. This is equivalent to four single carburettors, each one supplying three cylinders of the engine. Each duplex carburettor consists of a single float chamber and a single air inlet joined to two separate and distinct spray nozzles, venturi and idling devices. (As the V-type engine is, in a sense, two separate engines, joined together for greater utility, so the Zenith is built in double form for the purpose of supplying each one of these two engines with its exact requirements.) Each of the two barrels of each carburettor is fitted with a throttle valve of the butterfly type. The shafts of the throttles are parallel with the centerline of the engine, or "fore and aft," and are interconnected by means of gear sectors pinned to the throttle shafts and meshing together. The two pairs of throttles are operated simultaneously by a shaft, provided with an adjustment at each end by means of which the pairs may be synchronised. Each duplex carburettor is fitted with an altitude adjustment which affects both barrels equally.

#### Clearances Used in the Liberty Engine

	Minimum	Maximum	Desired
<b>Crankshaft—</b>			
Diametrical clearance ..	0.0025	0.00325	
End play ..	0.0575	0.0775	
<b>Connecting rods—</b>			
<b>Forked end—</b>			
Diametrical clearance	0.003	0.004	
End play ..	0.008	0.020	
<b>Plain end—</b>			
Diametrical clearance	0.005	0.0065	
End play ..	0.004	0.008	



#### Restrictions on Manufacture Suspended

THE Minister of Munitions has suspended until further notice—which means in effect permanently—the Aeroplanes (Experimental Manufacture) Order, 1917, and the Aero Engines (Experimental Construction) Order, 1918, which prohibited the experimental manufacture without a licence of any aeroplane, seaplane, or part thereof, or any aero engine. Experimental manufacture meant, it will be remembered, any manufacture not under Government contract, and included even the preparation of working drawings, but not of general arrangement drawings.

The whole industry will be vastly relieved at the removal of these restrictions on its peace-time activities. Undoubtedly it was essential for the purposes of the War that experimental work of the kind indicated in the Orders should be restricted and the whole effort of the industry concentrated on war work. Now that the War is over and these reasons no longer enter into the calculation, it is satisfactory to know that the Minister of Munitions is losing no time in removing the restrictions.

#### Aluminium Orders Suspended

THE Ministry of Munitions has suspended the operation of the following Orders:—

The Aluminium Order, 1916, dated December 2nd, 1916.

The Aluminium (Returns) Order, 1917, dated February 17th, 1917.

The Aluminium (Scrap and Swarf) Order, 1917, dated February 28th, 1917.

The Ministry has revoked as from the 31st ult. the Refractory Materials (Maximum Prices) Order, 1918, dated November 19th, 1918.

#### Timber Restrictions Removed

THE Board of Trade announce that as from January 1st, no permits will be required for dealing in timber of any kind in the United Kingdom. As from the same date no permits will be required for buying, selling, or negotiating for the transport of hardwood timber, rattans, or Malacca canes outside the United Kingdom for delivery to places abroad.

	Minimum	Maximum	Desired
<b>Piston pin—</b>			
Fit in rod ..	0.00025	0.00125	Select for .001 clearance
Fit in piston ..	0.00025	0.00075	Select for light drive fit
	Loose	Tight	Top 0.003 ;
			Mid. and
<b>Piston rings—</b>			Bot. 0.002
Fit in grooves ..	0.00125	0.003	0.030
Gap ..	0.021	0.041	Select for
<b>Piston—</b>			0.020 clearance
Fit in cylinder ..	0.018	0.022	
<b>Camshaft—</b>			
Diametrical clearance ..	0.001	0.003	
End play ..	0.000	0.004	Min. 0.002
<b>Camshaft upper driveshaft—</b>			
Diametrical clearance—			
Large bushing ..	0.0005	0.0025	Min. 0.0015
Small bushing ..	0.0005	0.0025	Min. 0.0015
End play ..	0.002	0.008	Min. 0.004
<b>Rocker levers—</b>			
Diametrical clearance ..	0.00025	0.00175	Min. 0.001
End play ..	0.005	0.010	0.0075
<b>Valves—</b>			
Fit of stems in guides—			
Diametrical clearance—			
Exhaust valve ..	0.004	0.0065	0.005
Inlet valve ..	0.002	0.0045	0.003
<b>Water pump shaft—</b>			
Diametrical clearance ..	0.0015	0.0035	Min. 0.0025
End play ..	0.006	0.010	0.010
<b>Water pump bevel driver—</b>			
Diametrical clearance ..	0.001	0.0025	
End play ..	0.005	0.008	
<b>Oil pump—</b>			
Fit of gears in housing—			Select for
Diametrical clearance	0.001	0.005	0.004 clearance
			Select for
End play ..	0.002	0.007	0.003 clearance
<b>Tappet gap—</b>			
Exhaust valve ..	0.019	0.021	
Inlet valve ..	0.013	0.016	
Breaker gap ..	0.010	0.013	
Spark plug gap ..	0.015	0.015	0.015
<b>Regulator—</b>			
Contact gap ..	0.005	0.007	
Height of pin ..	0.043	0.045	

The Export of Timber (Ireland) Order, 1917, and the Packing Case and Lapping Board Order, 1918, are also revoked.

#### Mr. Bertram Jones Leaves the Air Ministry

IN view of the Armistice, and pending demobilisation and the re-organisation of the Air Ministry which must follow, the Air Council have decided that the work entrusted to Mr. Bertram Jones, of reporting on the war system of provision, maintenance and issue of stores, should be discontinued. The Council have conveyed an expression of warm appreciation to Mr. Jones for his services, and for his great assistance, in an honorary capacity, to the Air Ministry, during the last year, in connection with the organisation of a Finance Division, and thereafter with questions arising in the Department of Equipment.

#### More Possible Entries for the "Daily Mail" Prize

ALTHOUGH definite entries have not yet been made, three more possible competitors for their trans-Atlantic prize have been mentioned by the *Daily Mail*. One is a Curtiss "Colossus" flying-boat, which may be piloted by a U.S. Navy pilot, another is Lieut.-Col. R. Collishaw, D.S.O., a Canadian pilot, who proposes to use a five-engined Handley Page, and the third is Lieut. Pat. O'Brien, who has not disclosed what machine he proposes to use, but will have Capt. I. F. Fuller and Lieut. C. C. Robinson as his companions.

#### Food by Aeroplane

IN certain districts in Northern France the inhabitants are having a somewhat parlous time owing to the fact that Germans in their retreat blew up roads and railway bridges, thus preventing supplies being sent up. The French Government has now decided to utilise aeroplanes to carry the necessary provisions into the impoverished districts. French, British and American, as well as some of the German aeroplanes handed over under the Armistice agreement, will be utilised, and it is hoped that 70 tons of food will be conveyed daily.