and those which utilise a forced circulation. Under this latter heading come the last three motors mentioned above. The Gnome is a rotary motor, and its cylinders therefore whirl round in the air; the Farcot has stationary cylinders set horizontally with a direct-driven fan mounted about them; the Renault is a "V" engine, and induces a draught about its cylinders by the use of a fan and piping.

Although the Antoinette has been mentioned above as belonging to the water-cooled class, it should, as a matter of fact, be placed in a category by itself, which might not inappropriately be termed "steam-cooled." The latest Antoinette system is to carry such a small amount of water in the reservoir that it quickly boils, and they provide an aluminium condenser to condense the steam thus formed. This condenser forms part of the Antoinette installation for their own aeroplanes, but, in the ordinary way, the purchaser has the option of buying the engine separately and using an ordinary radiator with a larger supply of water.

TABLE OF FLIGHT MOTORS AT THE PARIS SALON.

h.p.	Type.	Cyls.	Bore.	Stroke.	R.P.M.	Weight.	R.A.C. Rating.	Kilogs. per h.p.	Lbs. per h.p.	Remarks.
	Water Cooled.		mm.	mm.		kgs.	h.p.			
20	Antoinette ...	8	80	80	1400	42	32	1·3	2·9	V type; atmospheric inlet-valves; injected fuel; steam cooling.
50	Antoinette ...	8	110	105	1100	95	60	1·6	3·5	
50	Antoinette ...	16	80	80	1400	75	64	1·2	2·6	
100	Antoinette ...	16	110	105	1100	120	120	1·0	2·2	
60	J.A.P.	8	90	110	1300	138	40	3·5	7·6	V type; mechanical valves.
50	Clement-Bayard	7	100	115	1100	70	43	1·6	3·6	Horizontal radial; mechanical valves.
32	Wright (B.M.) ...	4	108	110	1200	80	29	2·8	6·1	Vertical; mechanical valves.
80	Gobron	8	120	200	1400	160	72	2·2	4·9	X type; mechanical valves; 16 pistons.
50	E.N.V.	8	100	130	1000	150	50	3·0	6·6	V type; mechanical valves.
58	Dutheil-Chalmer	4	—	—	—	108	—	—	—	Horizontal opposed.
	De Korwin ..	—	—	—	—	—	—	—	—	Model of 4-stroke-cycle engine.
	Air-Cooled.									
20	R.E.P.	5	85	95	1600	53·5	22	2·4	5·3	Semi-radial; combined mechanical valve.
30	R.E.P.	7	85	95	1600	68	31	2·2	4·8	
50	R.E.P.	10	85	95	1600	97	45	2·2	4·7	
35	J.A.P.	8	85	95	1500	100	36	2·8	6·1	V type; mechanical valves.
50	Anzani	3	135	150	1200	108	34	3·2	7·0	Semi-radial; atmospheric inlet-valve.
30	De Korwin (Buchet)	6	80	80	1800	50	24	2·1	4·6	Semi-radial.
50	Fiat	8	—	—	—	60	—	—	—	V type; mechanical valves.
	With Fan.									
45	Renault	8	90	120	1500	145	40	3·6	8·0	V type; mechanical valves; enclosed fan.
75	Farcot	8	105	120	1200	110	55	2·0	4·4	Horizontal radial; combined mechanical valve; open fan.
50	Gnome	7	110	120	1200	75	52	1·4	3·2	Rotary radial type; atmospheric inlet-valve in piston.

Light Water-Jackets.

Where water-cooling is employed, every effort is usually made that the cylinder-jackets shall be as light as possible. In two instances—Antoinette and E.N.V.—the jackets are formed by electrolytically deposited copper; that is to say, the cylinders are first prepared with a thick coating of wax to represent the water space, and to form a surface upon which the copper can "grow" in the electrolytic bath. The wax surface is coated with black-lead to act as a conductive medium for the electric current which carries the copper, and when the jacket is finished the wax is, of course, melted out to leave a hollow space for the water.

On the Gobron and Clement engines, tubular brass jackets are employed, and in the latter case these are shrunk in their places. On the Wright engine, made by Bariquand and Marre, the jackets are aluminium tubes.

Combined Valves.

Another expedient for reducing the weight, which has been adopted by some makers, is the use of a valve which combines the purposes of an induction-valve and an exhaust-valve in one. Such a device is to be found on the R.E.P. engine, and also on the Farcot, but it cannot be said to have come into general practice as yet. Those makers who have adopted the principle have done so, of course, because they object to the atmospheric valve, such as is used on the Antoinette and some other engines, and also because they wish to effect the saving of some of the parts involved in the operation of two separate valves by mechanical means.

In the case of the R.E.P., the operation of the two separate valves would be all the more complicated on account of the arrangement of the cylinders, but the combined valve enables a very neat design of operating mechanism to be introduced. The Wright, J.A.P., E.N.V., and Renault engines have mechanically-operated inlet and exhaust valves. The Gnome rotary engine has an atmospheric valve in the piston, and a mechanically-operated exhaust-valve in the centre of the cylinder head. In several cases—the R.E.P. among them—the exhaust is allowed to blow straight out into the air without even passing through the shortest of pipes; in the case of the Gnome engine, the gases even impinge direct upon the valve-operating rock-lever.

(*To be concluded.*)

A Professor of Aeronautics.

ALTHOUGH there has been a good deal of talk with regard to founding a chair of aeronautics at various universities, we believe the first professor of aeronautics is Professor Prandtl, who has been appointed in Germany to lecture on the complete science of aeronautics at Göttingen University.

"Travel and Exploration"

Is the title of a new monthly magazine which is to deal with questions relating to touring and exploring on land and sea and in the air. In the first number, which has just been published, the features likely most to interest our readers are an article dealing with the history and achievements of dirigible balloons, which is contributed by Mr. Eric S. Bruce, and some notes on aërial flight showing why progress has not been made in this country, by Mr. H. Massac Buist. Some hints on motoring in snow are also from the pen of Mr. Buist. The new magazine is very interesting, and the many photographs with which it is illustrated are well reproduced, so that it should be assured of a large public.