



## A Review of Helicopter Patents

By L H HAYWOOD

*A paper presented to the Helicopter Association of Great Britain, on Friday, 18th January, 1952, at the Royal Aeronautical Society, 4 Hamilton Place, London, W 1*

NORMAN HILL, A M I MECH E, A R Ae S  
*in the Chair*

### INTRODUCTION BY THE CHAIRMAN

The CHAIRMAN, introducing the author, said Mr HAYWARD is a member of the Helicopter Association of Great Britain. He is a Bristol man, having been educated in that city, and later he served a five-year apprenticeship with the Bristol Aeroplane Company, Limited. He served for some time on the technical staff of D Napier & Son, returning to The Bristol Aeroplane Company in 1945, and from there joined the Fairey Aviation Company as Patent Engineer.

The title of Mr Hayward's paper is, I think, deceptive, for not only does he give a comprehensive review of the helicopter patent situation, but in addition almost a complete history of the helicopter through the ages, from Leonardo da Vinci to present day developments in the propulsion of helicopter rotors by jet motor.

It also has a message for all of us engaged in technical development work, for as he proceeds we become aware of the importance of enlisting the aid of professional advice in the preparation of a patent specification. The law and practice relating to patents for inventions is complex and is fully comprehensible only to the experienced professional patent agent.

This meeting is held jointly with the Chartered Institute of Patent Agents, and to the members of that Institute who are present we, the members of the Helicopter Association, extend a warm welcome.

It now gives me great pleasure to introduce to you Mr L H HAYWARD and to invite him to proceed with his lecture.

### MR HAYWARD

I should like to thank The Helicopter Association for the honour of their invitation to present my paper. I must also place on record the assistance given to me by The Fairey Aviation Company Limited who provided the sixty-nine lantern slides forming the illustrations for my paper.

### Editors Note

In view of its length and the many illustrations in this interesting paper it is not practical to reproduce the material in full within the limited space of this Journal

Members should note, however, that fully illustrated copies of the Paper will be kept for reference purposes at the Association's Offices, and that these copies will be made available on loan

In addition, it is hoped that it may be possible to produce a supplement to this Journal, which will be circulated at a later date free to all Members, and which will contain Mr HAYWARD'S Paper fully illustrated as reprinted from, and with the kind permission of, AIRCRAFT ENGINEERING

The following is a list of the Patents covered by the Paper, and an account of the discussion that followed its presentation

### Section I (History)

	<i>Early Experimenters</i>	<i>Date</i>	<i>G B</i>	<i>Patent No</i>
1	Leonardo da Vinci	1452—1519		
2	M Paucton	1736—1798		
3	M Launoy and M Bienvenu	1784		
4	Count Lambertgye	1818		
5	V Sarti	1828		
6	D Mayer	1828		
7	W H Phillips	1842		
8	Sir G Cayley	1843		
9	H Bright	1859		2330
10	An unknown inventor	1860		
11	Viscount de G L M Ponton d'Amecourt	1861		1929
12	Gabriel de la Landelle	1812—1886		
13	A Penaud	1870		
14	E Forlanini	1877		
15	Delpred	1877		
16	M P Castel	1878		
17	E Dreuade	1878		
18	T A Edison	1880—1897		
19	R G Owen	1885		9193
20	G F Redfern	1886		7015
21	J Craig	1889		3360
22	J C Walker	1892		634
23	E C de Los Olivos	1895		
24	J Roots	1896		3657
25	R Kosch	1896		9129
26	G L O Davidson	1896		12469
27	B R Beenen	1897		9864

### PATENTS RELATING TO JET PROPULSION OF HELICOPTERS

#### Section II

	<i>Patentee</i>	<i>Date</i>	<i>G B</i>	<i>U S A</i>	<i>Fr</i>	<i>Others</i>
28	M A Quentin	1908			394652	
29	M Heroult	1909		1021521		
30	H A Duc	1910		1099083		
31	A Papin & D Rouilly	1912	10633	1133660	440593/4	
32	W Strong	1915		1344661		
33	F Bernards	1922				German, 362850
34	H Ypma	1923		1523926		
35	B Carter & J Coales	1923	227151			
36	E N Fales	1924		1484632		
37	J P Serrell	1927	275677		648107	
38	H F Pitcairn	1927		1820946		
39	H Farman	1928				German, 462238

	<i>Patentee</i>	<i>Date</i>	<i>G B</i>	<i>U S A</i>	<i>Fr</i>	<i>Others</i>
40	Autogiro Co of America	1929	327211	1897092		Dutch 27189
41	I Sikorsky	1929		1848389		
42	F A Howard	1929	366450			
43	Langdon	1930		1932702		
44	Holmes & Skelton	1932		1923054		
45	Dr Dornier	1933	413184			
46	Dr Dornier	1933	413336			
47	Dr Dornier	1933	413941			
48	Dr Dornier	1933	415917			
49	Dr Dornier	1933	412487			
50	M Bleecker	1935		2142601		
51	H de Bruijn	1935				Dutch 37365 47909
52	E A Stalker	1935		2041796		
53	M Tassin de Montaigu	1935			807110	
54	M Knight & T Moodie	1936		2092077		
55	P Salles	1938			838828	
56	F Howard	1938		2330056		
57	Autogiro Co of America	1939	2	2301417		
58	C T Ludington & R W Griswold	1939		2408788		
59	E A Stalker	1941		2372030		
60	W F Gerhardt	1942		2371687		
61	J Kundig	1942		2397357		
62	G & J Weir Ltd	1942	563427			
63	A Gazda	1943		2486276		
64	L H Leonard	1943		2444781		
				2479125		
65	A Sbrilli	1944		2396130		
66	J O de Chappede-laine	1944	576738			
67	The Fairey Aviation Co	1944	581217		927246	Belgian, 465768 Australian, 126944
68	R W Jenny	1944		2466813		
69	J S Pecker	1944		2464651		
70	S S Elsby	1944		2490623		
71	R B Davis	1944		2438151		
72	A R Wilcox	1944		2462587		
73	United A/c Corp	1945		2498283		
74	G & J Weir Ltd	1945	556865			
75	G & J Weir Ltd	1945	556866	2429646		
76	G & J Weir Ltd	1945	557011	2429646		
77	J W MacFarland	1945		2437700		
78	V Isacco	1945	601911		933141	
79	V Isacco	1945	601912		934803	
80	V Isacco	1945	601913	2474359		Canada, 478439
81	V Isacco	1945	601953			
82	Dr Dornier	1932				German, 595915
83	T L Cummings	1946		2446266		
84	E A Stalker	1946		2457936		
85	The Cierva Autogiro Co	1946	612189			
86	The Cierva Autogiro Co	1946	612468			

	<i>Patentee</i>	<i>Date</i>	<i>G B</i>	<i>U S A</i>	<i>Fr</i>	<i>Others</i>
87	S N C A Centre	1946	634332		931296	
88	The Fairey Aviation Co	1946	614676			
89	The Cierva Autogiro Co	1946	614621/2/3/4			
90	The Cierva Autogiro Co	1946	614695/6			
91	The Fairey Aviation Co	1947	627117			
92	E A Stalker	1948		2516489		
93	The Fairey Aviation Co	1948	632065			
94	B Nicholaeff	1948		2472917		
95	H F Pitcairn	1948		2440758		
96	The Autogiro Co of America	1948	654757			
97	H J McCollum	1949		2485502		
98	D T Dobbins	1950		2514749		

## Discussion

**The Chairman** I do really think Mr HAYWARD is to be congratulated on the scope of his most absorbing paper

**Mr E W Micklethwaite** (*Messrs Kelburn and Strodé*), who was invited to open the discussion, said I think it is only fair to say that I had not suggested speaking at all, but I was warned that there was a danger of my being called upon to do so, and perhaps the reason is that my knowledge and experience of helicopters, of their history and their design, is probably less than that of anybody else here So that I can speak unfettered by any expert knowledge or preconceived ideas

As "a man in the street," when I read the paper, admittedly without the aid of any of the pictures we have seen this evening, I found it a little indigestible I said to the author that I would not compare it with a card index, but that there seemed to be very little connection between one suggestion or development and the next, and I wondered whether it would be possible to arrange the information in the order of development of the various ideas He replied that he had tried doing that, but he had got into such a muddle that he had had to give up and revert to the purely chronological arrangement I thought that interesting, and it suggested to me that probably the inventors of the various designs did not in all cases familiarise themselves with everything that had been suggested before Probably some of the suggestions are a little fantastic, but undoubtedly there are a great many earlier ideas which might contribute to those of the later inventors

Coming back to the beginning of the paper, Mr Hayward referred to Leonardo da Vinci In connection with almost any subject of invention it is fairly safe to assume that Leonardo da Vinci "had a go," and in this case we are not disappointed In his notebooks (translated by MacCurdy) there is a picture of a sort of screw revolving around a vertical axis, with the note —"Let the outer extremity of the screw be of steel wire as thick as a cord, and from the circumference to the centre let it be 8 braccia" That is a diameter of about 32 ft Then he states "I find that if this instrument made with a screw be well made—that is to say, made of linen of which the pores are stopped up with starch—and be turned swiftly, the said screw will make its spiral in the air and it will rise high" That rather suggests that he probably flew it, which is likely, because he did a number of flights—and killed a number of his apprentices

But there does not appear to have been an engine in this machine One wonders what would have happened if Leonardo da Vinci had studied the work of Hero (or Heron) of Alexandria, who made one of the first steam engines (about the year 200 A D or possibly a good deal earlier) which had a jet-propelled rotor There was a hollow globe to which steam was admitted from one of two trunnions, and there were two L-shaped nozzles through which steam came out and spun it round Possibly