

RATES OF DECK WATCHES

ON TRIAL

FOR PURCHASE BY THE BOARD OF ADMIRALTY,

AT THE

ROYAL OBSERVATORY, GREENWICH

FROM 1898 OCTOBER 22 TO 1899 FEBRUARY 11.

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(1) WEEKLY RATES IN ORDER OF TIME.

NAME OF MAKER.	No.	Oct. 22-29.	Oct. 29 to Nov. 5.	Nov. 5-12.	Nov. 12-19.	Nov. 19-26.	Nov. 26 to Dec. 3.	Dec. 3-10.	Dec. 10-14.	Dec. 14-17.	Dec. 17-20.	Dec. 20-24.	Dec. 24-31.
		Watch Horizontal. Dial up.											
		Watch Vertical. Dial up.											
		Watch Vertical. Dial up.											
		Watch Vertical. Dial up.											
		Watch Vertical. Dial up.											
Janus	1898	+ 29.1	+ 26.6	+ 24.8	+ 22.5	+ 20.2	+ 17.7	+ 15.2	+ 12.7	+ 10.2	+ 7.7	+ 5.2	+ 2.7
Mathews	34885	+ 18.2	+ 29.9	+ 16.9	+ 12.9	+ 10.9	+ 16.1	+ 19.1	+ 17.1	+ 16.1	+ 15.1	+ 14.1	+ 13.1
Usher and Cole	28677	- 0.5	- 5.0	- 2.9	- 0.4	- 10.6	- 5.9	- 5.1	- 11.6	- 11.0	- 12.0	- 12.0	- 12.0
J. Player and Sons	32454	+ 16.0	+ 10.7	+ 12.4	+ 11.4	+ 18.8	+ 20.5	+ 9.1	+ 5.1	+ 10.5	+ 12.5	+ 13.5	+ 14.5
Mathews	34884	- 12.8	- 13.0	- 13.3	- 14.2	- 16.1	- 25.5	- 34.6	- 0.5	- 4.9	- 4.2	- 2.6	- 37.4
Newsome and Co.	129690	+ 35.4	+ 37.5	+ 38.9	+ 38.7	+ 38.8	+ 37.4	+ 37.4	+ 1.6	+ 3.7	+ 7.7	+ 21.9	+ 41.9
Mathews	34884	+ 9.8	+ 4.0	+ 7.3	+ 6.9	+ 8.7	+ 10.0	+ 7.4	+ 2.1	+ 6.8	+ 9.5	+ 5.9	+ 1.9
G. Carley and Co.	50091	- 10.7	- 8.4	- 9.9	- 9.2	- 8.4	- 8.8	- 28.4	- 1.4	- 26.4	- 23.8	- 8.8	- 4.9
Wain and McCulloch	34774	+ 15.1	+ 14.7	+ 15.4	+ 22.7	+ 22.1	+ 18.8	+ 37.3	+ 2.6	+ 8.4	+ 9.5	+ 19.0	+ 32.2
E. White	7167	+ 15.1	+ 14.7	+ 15.4	+ 22.7	+ 22.1	+ 18.8	+ 37.3	+ 2.6	+ 8.4	+ 9.5	+ 19.0	+ 32.2
Mathews	34837	- 17.5	- 19.4	- 21.0	- 19.1	- 19.9	- 19.7	- 21.5	+ 59.5	- 11.4	- 19.1	+ 63.2	- 12.4
Newsome and Co.	131412	- 6.1	- 4.4	+ 0.8	+ 6.8	+ 9.7	+ 7.9	+ 14.4	+ 29.4	+ 27.8	+ 37.8	+ 30.6	+ 23.0
Wain and McCulloch	34774	+ 15.1	+ 14.7	+ 15.4	+ 22.7	+ 22.1	+ 18.8	+ 37.3	+ 2.6	+ 8.4	+ 9.5	+ 19.0	+ 32.2
Johnsen and Co.	6543	+ 15.9	+ 14.8	+ 16.9	+ 16.6	+ 18.2	+ 11.2	+ 21.9	+ 10.5	+ 11.4	+ 14.5	+ 20.3	+ 38.6
Thomson	1052	- 7.2	- 10.8	- 18.2	- 16.2	- 22.0	- 24.8	- 7.2	- 4.9	- 9.8	- 2.6	- 0.0	+ 1.2
Hall	1683	+ 20.9	+ 24.9	+ 26.3	+ 24.6	+ 31.3	+ 29.9	+ 20.8	- 31.2	+ 9.5	- 2.1	- 19.4	+ 37.1
Mackay and Chisholm	50194	+ 18.8	+ 21.6	+ 24.2	+ 26.9	+ 28.9	+ 32.2	+ 31.1	+ 15.4	+ 28.8	+ 18.9	+ 22.4	+ 31.1
Newsome and Co.	131412	- 6.1	- 4.4	+ 0.8	+ 6.8	+ 9.7	+ 7.9	+ 14.4	+ 29.4	+ 27.8	+ 37.8	+ 30.6	+ 23.0
Hall	1706	+ 4.7	+ 4.6	+ 5.7	+ 2.1	+ 2.8	+ 5.9	+ 16.4	+ 14.8	+ 9.7	+ 1.3	+ 6.8	+ 25.9
Usher and Cole	28684	- 12.7	- 23.0	- 20.3	- 18.8	- 22.4	- 25.0	- 10.0	+ 8.4	+ 9.5	+ 11.9	+ 15.9	+ 28.8
H. Smith	302	+ 16.4	+ 17.0	+ 16.5	+ 14.1	+ 14.1	+ 10.5	+ 20.1	+ 4.6	+ 7.9	+ 11.0	+ 8.1	+ 27.7
Lindsay	0108	- 26.4	- 31.9	- 34.0	- 35.6	- 37.5	- 36.8	- 23.1	- 4.0	- 1.2	- 24.3	+ 6.8	- 4.7
Thomson	1054	+ 10.4	+ 11.4	+ 10.4	+ 11.4	+ 11.5	+ 6.6	+ 7.8	+ 12.4	+ 7.5	+ 4.7	+ 1.4	+ 24.0
Thomson	71613	+ 14.4	+ 8.1	+ 0.6	+ 6.2	+ 9.4	+ 16.8	+ 7.8	+ 12.4	+ 7.5	+ 4.7	+ 1.4	+ 24.0
Johnsen and Co.	6544	+ 0.2	+ 3.8	+ 0.1	- 2.6	+ 1.8	- 2.4	+ 10.3	+ 1.6	+ 4.7	+ 8.2	+ 7.7	+ 25.1
Hill	149931	+ 38.7	+ 38.6	+ 40.7	+ 40.6	+ 37.5	+ 34.7	+ 38.0	+ 42.9	+ 52.0	+ 60.9	+ 57.6	+ 68.5
E. White	7168	+ 12.1	+ 13.1	+ 12.1	+ 11.1	+ 12.1	+ 22.8	+ 14.4	+ 11.6	+ 17.7	+ 25.7	+ 32.9	+ 41.9
D. Keys Ltd.	16862	- 11.1	- 13.6	- 14.0	- 17.2	- 19.1	- 22.8	- 14.4	+ 11.6	+ 17.7	+ 25.7	+ 32.9	+ 41.9
J. White and Sons	38224	- 32.0	- 32.0	- 35.4	- 36.2	- 36.7	- 38.5	- 18.3	- 14.8	- 15.8	- 25.2	- 4.7	- 15.8
J. Player and Sons	32455	- 65.9	- 65.0	- 65.8	- 70.0	- 70.0	- 74.0	- 94.9	- 59.3	- 55.8	- 45.2	- 45.6	- 45.2
Burton	4021	- 23.7	- 29.7	- 38.6	- 43.9	- 38.5	- 39.8	- 22.1	- 24.9	+ 5.4	+ 10.0	- 18.2	- 0.7
Hall	1684	- 9.9	- 4.4	- 4.9	- 8.5	- 12.0	- 18.4	- 17.7	+ 10.1	+ 19.6	+ 25.7	+ 32.9	+ 41.9
J. Player and Sons	27166	- 16.5	- 24.7	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9	- 31.9
Wright and Crangford	61222	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4	- 2.4
Thomson	71622	- 25.0	- 25.8	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0	- 26.0
Mean Weekly Temperature		62.8	59.0	58.8	57.5	54.6	51.7	83.8	82.0	78.6	78.6	76.4	76.4
Extremes of Temperature as shown by the Self-Registering Thermometers		60.3-66.0	56.0-61.8	57.0-60.6	55.7-60.8	51.1-59.1	47.8-58.2	70.0-88.2	73.8-89.5	73.8-89.5	73.8-89.5	69.0-84.0	69.0-84.0

* The Weekly Rates have been computed from the rates for three days.

During the period Dec. 3-5, the watches were placed in an oven heated by jets of gas, the temperature being regulated by Kullberg's automatic governor, which controls the supply of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter.

Hall, 1683. This watch stopped during the 12th week of the trial.

* The Weekly Rates have been computed from the rates for four days.

During the period Dec. 3-5, the watches were placed in an oven heated by jets of gas, the temperature being regulated by Kullberg's automatic governor, which controls the supply of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter.

Hall, 1683. This watch stopped during the 12th week of the trial.

(2) ABSTRACT OF THE PRINCIPAL CHANGES OF RATE.

Dec. 21 to Jan. 7.	Jan. 7-14.	Jan. 14-21.	Jan. 21-28.	Jan. 28 to Feb. 4.	Feb. 4-11.	Difference between greatest and least Weekly Rate.	Greatest difference between the greatest and the least Weekly Rate.	Difference of Weekly Rates.	Trial Number.	NAME OF MAKER.	No.
						a.	b.	c.	d.	e.	f.
+ 22.8	+ 23.0	+ 20.3	+ 20.2	+ 20.0	+ 26.2	16.0	6.6	- 4.4	- 39.5	- 48.0	70.1
+ 15.6	+ 15.6	+ 10.4	+ 10.4	+ 12.8	+ 10.4	18.7	- 18.7	- 7.6	- 11.4	- 3.2	67.4
+ 22.8	+ 22.8	+ 14.7	+ 14.7	+ 20.4	+ 17.4	20.4	11.0	- 10.0	- 11.4	- 3.2	67.4
+ 22.8	+ 22.8	+ 1.9	+ 5.9	+ 1.6	+ 1.3	22.1	11.4	- 12.4	- 18.9	- 94.0	68.8
+ 22.9	+ 23.6	+ 23.5	+ 23.5	+ 23.6	+ 23.6	22.3	10.1	+ 35.4	+ 28.9	+ 28.9	70.1
+ 14.9	+ 19.1	+ 18.1	+ 19.1	+ 14.7	+ 15.6	27.8	17.1	- 8.2	- 14.2	- 12.1	70.5
+ 4.3	+ 4.1	+ 4.8	+ 3.4	+ 7.1	+ 8.1	23.3	17.6	+ 10.2	- 9.9	- 8.9	71.1
+ 40.9	+ 49.8	+ 55.0	+ 49.8	+ 43.5	+ 50.6	40.3	15.2	- 0.9	- 10.9	+ 1.9	72.7
- 21.8	- 22.0	- 19.1	- 10.1	- 14.3	- 6.7	15.8	8.9	+ 78.4	+ 5.6	- 2.1	73.6
+ 9.1	+ 18.9	+ 15.3	+ 9.7	- 0.8	+ 16.4	23.1	17.2	+ 11.3	+ 9.1	+ 19.1	73.9
+ 44.4	+ 35.2	+ 30.7	+ 30.6	+ 28.9	+ 27.3	23.3	21.3	- 0.0	+ 2.0	- 18.3	74.0
+ 18.4	+ 20.5	+ 17.9	+ 28.2	+ 19.4	+ 17.9	25.4	18.2	- 17.9	- 17.9	- 14.8	74.3
- 21.8	- 16.4	- 19.4	- 22.9	+ 27.3	- 20.8	28.5	22.5	+ 10.6	+ 5.3	- 5.6	75.6
+ 39.4	+ 38.5	+ 30.4	+ 32.1	+ 32.5	+ 33.7	16.2	11.4	- 57.3	- 82.5	- 94.1	77.1
+ 31.9	+ 36.5	+ 30.4	+ 32.1	+ 32.5	+ 33.7	27.4	23.1	- 3.8	- 3.8	- 3.8	77.6
- 89.5	- 86.1	- 86.9	- 80.2	- 86.2	- 85.5	24.0	22.8	+ 10.3	+ 7.7	+ 10.4	79.0
+ 31.9	+ 36.5	+ 30.4	+ 32.1	+ 32.5	+ 33.7	23.8	17.0	- 25.0	- 24.4	- 21.9	79.1
+ 5.8	+ 17.3	+ 18.4	+ 15.1	+ 8.2	+ 14.5	21.9	21.9	- 17.5	- 16.0	- 12.9	79.3
- 23.7	- 23.8	- 23.2	- 23.8	- 23.9	- 24.4	22.8	19.0	+ 15.2	+ 12.7	+ 10.4	82.4
+ 8.9	+ 13.2	+ 13.2	+ 13.2	+ 13.2	+ 13.2	27.8	19.4	- 18.4	- 24.2	- 20.7	82.2
- 13.0	- 9.2	- 2.7	- 5.5	+ 11.1	+ 14.9	81.7	24.6	+ 8.9	+ 1.4	+ 2.8	83.6
+ 2.8	- 1.2	- 8.6	+ 2.8	- 0.8	- 1.4	38.7	22.9	- 14.6	- 13.0	- 9.5	84.4
+ 44.0	+ 49.5	+ 49.7	+ 45.3	+ 41.4	+ 47.7	33.8	24.5	- 3.9	- 1.3	+ 7.6	85.8
- 25.7	- 29.9	- 29.7	- 29.7	- 29.7	- 29.7	27.8	28.0	+ 30.6	+ 28.9	+ 20.7	86.5
- 40.0	- 39.2	- 40.5	- 39.2	- 38.8	- 40.0	30.7	26.9	+ 0.8	+ 9.5	+ 11.0	86.2
- 72.6	- 71.9	- 69.4	- 67.5	- 68.4	- 70.8	38.7	27.3	+ 2.5	+ 1.2	+ 8.9	88.4
- 15.5	- 9.7	- 22.9	- 20.1	- 24.4	- 18.5	42.2	17.9	- 10.2	+ 16.8	+ 21.4	89.5
- 25.7	- 29.9	- 29.7	- 29.7	- 29.7	- 29.7	27.8	28.0	+ 30.6	+ 28.9	+ 20.7	89.5
- 25.7	- 29.9	- 29.7	- 29.7	- 29.7	- 29.7	27.8	28.0	+ 30.6	+ 28.9	+ 20.7	89.5
- 18.1	- 16.9	+ 16.9	+ 18.1	+ 18.1	+ 20.6	22.9	18.9	- 42.5	- 18.7	- 59.0	90.7
The sign + indicates a gaining rate.											
The quantities a, b, c, d, e, in the formulae a + 2b + c + d + e + f, are taken numerically, without regard to sign.											
48.0-62.1	46.0-56.8	60.8-55.7	46.8-56.6	46.2-55.7	49.0-58.5						

Only those watches have been included in this list for which the trial number did not exceed 100.

(1) WEEKLY RATES IN ORDER OF TIME.

NAME OF MAKER.	No.	Oct. 22-29.	Oct. 29 to Nov. 5.	Nov. 5-12.	Nov. 12-19.	Nov. 19-26.	Nov. 26 to Dec. 3.	Dec. 3-10.	Dec. 10-14.	Dec. 14-17.	Dec. 17-20.	Dec. 20-24.	Dec. 24-31.
		Watch Horizontal. Dial up.						Watch Vertical. Pendant up.	Watch Vertical. Pendant right.	Watch Vertical. Pendant left.	Watch Vertical. Pendant up.	Watch Horizontal. Dial up.	
Thornloe	1067	- 30.0	- 31.3	- 10.3	- 1.2	- 16.1	- 15.0	- 28.0	- 5.3	+ 9.5	+ 4.2	+ 11.0	- 13.5
Thornloe	1080	- 10.7	- 8.7	+ 7.4	- 4.2	- 16.2	- 26.3	- 9.1	- 13.1	- 10.5	- 9.8	- 4.9	+ 3.3
Johannes and Co.	6240	+ 18.9	+ 26.9	+ 25.9	+ 27.8	+ 31.0	+ 30.3	+ 40.0	+ 18.8	- 0.2	+ 58.3	+ 30.5	+ 61.7
B. Smith	241	- 9.5	- 14.0	- 17.3	- 17.6	- 17.7	- 21.1	- 9.8	- 8.0	- 0.2	+ 0.5	+ 7.2	- 13.0
Usher and Cole	29313	+ 24.4	+ 27.2	+ 25.5	+ 25.7	+ 23.1	+ 23.1	+ 49.5	+ 38.5	+ 39.0	+ 41.5	+ 41.8	+ 54.7
[Smith's Co.]													
Northern Gold and Silver	50157	+ 6.8	+ 9.7	+ 8.7	+ 13.1	+ 17.3	+ 15.6	+ 13.3	+ 30.6	+ 36.4	+ 34.5	+ 33.7	
Burton	4222	- 22.4	- 15.7	- 17.4	- 19.0	- 11.7	- 17.4	- 7.0	- 30.1	+ 13.6	+ 33.5	- 11.0	+ 2.8
Kendall and Dent	12514	- 28.0	- 27.4	- 22.2	- 17.4	- 13.0	- 15.8	- 27.5	+ 70.5	+ 33.7	- 72.6	- 13.2	
Roberts	20798	- 55.6	- 61.2	- 63.9	- 55.2	- 67.4	- 69.5	- 47.7	- 26.5	- 30.6	- 37.1	- 51.9	
Whitney	150568	- 43.9	- 46.1	- 47.0	- 48.6	- 45.5	- 46.8	- 37.8	- 28.9	- 11.4	- 9.3	- 6.8	- 13.9
Burton	4020	+ 30.9	+ 30.5	+ 30.8	+ 26.8	+ 22.9	+ 17.4	+ 30.8	+ 57.1	- 3.5	+ 11.7	+ 57.2	+ 42.4
B. Smith	301	+ 48.8	+ 51.9	+ 51.5	+ 49.6	+ 48.1	+ 45.2	+ 55.3	+ 20.7	+ 23.1	+ 24.0	+ 27.5	+ 75.1
Hill	146294	- 38.6	- 50.4	- 36.8	- 44.3	- 38.0	- 30.0	- 57.7	- 45.9	- 46.9	- 44.1	- 36.8	- 32.4
J. Player and Sons	30234	+ 3.2	+ 2.9	+ 1.5	+ 0.7	+ 4.0	+ 2.3	+ 16.6	+ 11.0	+ 12.4	+ 28.2	+ 23.1	+ 34.5
Duckey	30562	- 12.1	- 8.6	- 5.0	- 8.0	- 8.7	- 12.5	- 3.6	+ 39.6	- 34.1	+ 0.9	+ 30.1	- 23.3
Mean Weekly Temperature		62.3	59.0	56.8	57.5	54.6	51.7	53.3	52.0		78.6		76.4
Extremes of Temperature as shown by the Self-Regis- tering Thermometers		60.3-66.0	56.0-61.8	57.0-60.6	55.7-60.8	51.1-59.1	47.8-56.2	70.5-83.2	73.6-89.5		73.0-86.4		69.0-84.0

* The Weekly Rates have been computed from the rates for three days
During the period Dec. 3-31, the watches were placed in an oven heated by jets of gas, the temperature being regulated by Kullberg's automatic governor, which controls the supply of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter.

† The Weekly Rates have been computed from the rates for four days.
During the period Dec. 3-31, the watches were placed in an oven heated by jets of gas, the temperature being regulated by Kullberg's automatic governor, which controls the supply of gas. The gas flames are exterior to the chamber, into which none of the injurious products of combustion can enter.

(2) ABSTRACT OF THE PRINCIPAL CHANGES OF RATE.

Dec 31 to Jan. 7.	Jan. 7-14.	Jan. 14-21.	Jan. 21-28.	Jan. 28 to Feb. 4.	Feb. 4-11.	Difference between greatest and least Weekly Rates. Dial up. a.	Greatest difference between one week and the next. Dial up. b.	Difference of Weekly Rates. Pendant up. c.	Pendant right Dial up. d.	Pendant left Dial up. e.	Trial Number. $a + 2b + \frac{1}{2}(c + \frac{d+e}{2})$	NAME OF MAKER.	No.
- 8.9	- 8.8	- 13.6	- 15.8	- 12.4	- 8.7	30.1	21.0	+ 23.7	+ 24.3	+ 25.0	92.3	Thornloe	1067
- 24.0	- 23.9	- 25.2	- 23.0	- 26.8	- 24.6	34.2	27.3	- 6.1	- 7.6	- 6.9	92.3	Thornloe	1080
+ 48.0	+ 48.0	+ 46.6	+ 54.1	+ 51.5	+ 47.7	41.8	13.7	- 29.0	- 51.1	+ 7.8	90.5	Johannes and Co.	6240
- 15.0	- 12.0	- 12.7	- 11.2	- 18.5	- 8.9	39.1	28.0	- 4.5	5.3	4.6	94.0	B. Smith	241
+ 34.9	+ 46.1	+ 44.2	+ 39.3	+ 38.1	+ 30.3	31.6	26.4	- 11.9	- 13.1	- 10.6	94.4	Usher and Cole	29313
+ 8.6	+ 11.9	+ 9.7	+ 9.1	- 1.9	+ 4.5	35.6	35.1	+ 9.1	+ 12.9	+ 12.9	94.7	[Silversmith's Co.]	50157
- 28.1	- 21.5	- 24.1	- 24.0	- 25.3	- 22.3	23.3	23.1	- 15.7	+ 15.5	+ 35.4	95.6	Northern Gold and Silver	4222
- 17.8	- 16.7	- 16.2	- 15.6	- 16.5	- 15.7	14.3	11.7	+ 32.0	+ 10.9	- 13.4	96.0	Kendall and Dent	12514
- 80.9	- 82.6	- 79.3	- 78.9	- 87.8	- 80.4	40.1	21.8	+ 12.8	+ 14.9	+ 18.2	96.5	Roberts	20798
- 33.4	- 27.4	- 40.0	- 42.9	- 37.5	- 44.9	34.9	32.5	+ 10.8	+ 14.5	+ 10.6	96.5	Whitney	150568
+ 21.8	+ 25.1	+ 23.4	+ 13.3	+ 8.0	+ 18.1	34.4	20.6	+ 20.6	- 40.1	- 24.9	96.7	Burton	4020
+ 56.3	+ 59.5	+ 59.5	+ 63.8	+ 60.6	+ 64.2	23.9	16.8	- 41.1	- 42.1	- 41.2	98.0	B. Smith	301
53.4	70.4	70.9	- 62.2	67.8	55.2	40.9	27.7	+ 3.7	- 1.8	+ 1.0	98.7	Hill	146294
- 23.7	- 1.8	- 2.4	+ 7.3	+ 8.0	+ 4.0	33.8	29.2	- 8.5	- 13.2	+ 2.6	98.0	J. Player and Sons	30234
	- 10.8	- 4.1	+ 0.9	- 12.2	- 1.1	30.6	18.9	+ 51.4	- 17.6	+ 17.4	99.9	Duckey	30562
49.8	52.8	53.2	51.7	46.3	51.8								
46.0-52.1	46.0-55.8	50.8-55.7	46.8-56.6	46.2-55.7	43.0-56.5								

The sign + indicates a gaining rate.

The quantities a, b, c, d, e , in the formula $a + 2b + \frac{1}{2}(c + \frac{d+e}{2})$, are taken numerically without regard to sign.

Only those watches have been included in this list for which the trial number did not exceed 100.