Report of the Kew Committee for the Year ending October 31, 1876.

Magnetic Work.—The Magnetographs have been in constant operation throughout the year. The horizontal-force instrument has undergone readjustment of its suspension on two occasions, in order to increase its sensibility, which appears to have somewhat diminished of late.

In accordance with the usual practice, determinations of the scale-values of all the instruments were made in the first week of the new year, and of the Bifilar when required.

The monthly observations with the absolute instruments have been continued, as usual, by Mr. Whipple and Mr. Figg, and the results are given in the Tables appended to this Report.

The paper referred to in the last Report, containing the results of the Absolute Observations for the six years ending March 1875, having been read before the Royal Society, has been printed in vol. xxiv. of the 'Proceedings.'

The two Sergeants of the Royal Artillery, formerly in Sir E. Sabine's office at Woolwich, have been in regular attendance at Kew throughout the year, principally engaged in the preparation of his paper "Contributions to Terrestrial Magnetism, No. XV.," which will be printed in the Philosophical Transactions.

The tabulation of the magnetic curves, alluded to in the last Report as being in arrear, for the years 1871–73 was almost completed when it was stopped in May by the resignation of the extra assistant appointed for that work. The vacancy has not yet been filled, and the work, together with the measurement of the recent curves, is at present suspended.

Magnetic data have been supplied to Prof. Barrett, Prof. Core, Messrs. Elliott Brothers, Mr. Gordon, Dr. Guthrie, the Hydrographic Office, Prof. Balfour Stewart, Dr. Marshall Watts, and Mr. H. Watts.

The Unifilar, Declinometer, and Azimuth Compass used by Captains Anderson and Featherstonhaugh, of the Royal Engineers, during their operations in the North-American Boundary Commission, have been returned to Store in the Observatory, and the observations made with them having been examined, will be embodied in a paper shortly to be presented to the Royal Society.

Captain Maclear, R.N., has visited the Observatory, and, assisted by the Staff, redetermined the constants of the magnetic instruments used by him during the 'Challenger' Expedition, thus completing the observations by making Kew the base station of the voyage.

A communication having been made to the Committee by Mr. R. J. Ellery, Director of the Melbourne Observatory, requesting an expression of opinion from them as to the desirability of continuing the photographic registration of the magnetometers at his Observatory, and asking also for suggestions for dealing with the results obtained, a circular was drawn up, and replies to it were received from the following gentlemen :—

Prof. J. C. Adams.
Prof. W. G. Adams.
Prof. Buys Ballot.
J. A. Broun, Esq.
Captain F. J. O. Evans.
Prof. C. Hornstein.
Dr. C. Jelinek.
Prof. J. v. Lamont.
Rev. H. Lloyd, D.D.
Rev. R. Main.
C. Meldrum, Esq.
Major-General W. J. Smythe.
Prof. Balfour Stewart.
Prof. G. G. Stokes.
Prof. H. Wild.

Most of whom strongly advocate the continuance of self-recording magnetometers in Victoria.

Meteorological Work.—The several self-recording instruments for the continuous registration respectively of pressure, temperature, humidity, wind (direction and velocity), and rain have been maintained in regular operation under the care of Mr. T. W. Baker, assisted by T. Gunter. The daily standard eye-observations for the control of the automatic records have been made regularly, as well as daily observations in connexion with the Washington synchronous system.

In addition to the regular work of Kew as one of the self-recording Observatories in connexion with the Meteorological Office, the duty of examining and checking the work of the six other self-recording Observatories of the same character has been carried on, in accordance with the method described in the Report of the British Association for 1869. This portion of the work has been performed of late by Messrs. Hawkesworth, Aldridge, and Harrison.

The arrears of work, caused by the removal of Mr. Cullum to the charge of the Valencia Observatory, have been cleared off, and the work is now up to date.

The Observatories at Aberdeen, Armagh, Falmouth, Glasgow, Stonyhurst, and Valencia have been visited by Mr. Whipple, and their instruments inspected.

Electrometer.—This instrument having experienced an accidental

derangement in June has since failed in its action, and all attempts at setting it to work satisfactorily have been hitherto unsuccessful. The maker, Mr. White, of Glasgow, has promised to visit the Observatory at an early date and examine it to find the cause of failure.

A determination of the scale-value of the Electrometer by means of a 100-cell Bunsen battery was made in January.

Photoheliograph.—The Photoheliograph having been replaced in the Royal Observatory, Greenwich, by one of the instruments constructed for use in the Transit-of-Venus expeditions, was returned to the Observatory January 5th, and re-erected in the Dome, but was again dismounted in March, and sent, together with a number of solar negatives, to the Loan Exhibition, South Kensington, where it now remains.

The re-examination of the measurements of the Kew sun-pictures, as noticed in former Reports, has been steadily carried on throughout the year by Mr. Whipple, assisted by Mr. M'Laughlin, who has been temporarily engaged for this purpose; and the Ephemerides for the whole period of the Kew Sun-Spot Observations have been recalculated by Mr. A. Marth, and are now in the Observatory. All of these operations have been conducted at the expense of Mr. De La Rue.

A new Micrometer for use in India, with a Photoheliograph, has been made under the supervision of Mr. De La Rue, in which various modifications, suggested by experience obtained in the use of the instrument at Kew, have been introduced.

At the request of Mr. Hind, F.R.S., a careful inspection has been made of the Kew sun-pictures from 1858 to 1875, with a view to obtain evidence as to the existence of the intra-Mercurial planet. The observations bearing on the question have been communicated to that gentleman.

The eye-observations of the sun, after the method of Hofrath Schwabe, have been made daily by Mr. Foster, when possible, as described in the Report for 1872, in order, for the present, to maintain the continuity of the Kew record of sun-spots.

A catalogue of the Schwabe MSS., deposited in the Observatory, has been made for the Royal Astronomical Society.

Extra Observations.—The observations with Prof. H. E. Roscoe's Photometer were discontinued in November last, the year for which the experiment was undertaken having expired. The instrument has since been returned to the Owens College.

The Solar-radiation Thermometers are still observed daily.

The Campbell Sundial, described in the last Report, continues in action, and the improved form of the instrument, giving a separate record for every day of the duration of sunshine, has been regularly worked since March.

At the request of the Editor of the 'Times,' a copy of the traces of the self-recording instruments on a reduced scale, together with an epitome of the general features of the weather, is now prepared. This

is published every week in that journal, the cost to the Observatory being defrayed by the proprietors.

Verifications.—A fair increase has occurred in this branch of the work of the Observatory. The following magnetic instruments were verified :—

A Unifilar for Lieut. Wille, Norwegian Navy.
„ „ The Royal Naval College, Greenwich.
„ „ Elliott Brothers, London.
A Dip-circle „ Lieut. Wille, Norwegian Navy.
„ „ Captain Jelagin, St. Petersburg.
A Fox-circle „ Lieut. Wille, Norwegian Navy.
A pair of Dipping-needles for Dr. Rijckevorsel, Batavia.
„ „ „ Mr. Meldrum, Mauritius.
„ „ „ Senhor Capello, Lisbon.
A Dipping-needle „ Mr. Chambers, Colaba.
A set of three Magnets for Zi-ka-Wei Observatory.

A Dip-circle of a high degree of accuracy has been obtained, and after verification forwarded to Dr. Da Souza, Coimbra; and a similar instrument, having an accessory telescope fitted to enable it to be used as an altazimuth, has been purchased and verified for the Zi-ka-Wei Observatory.

The Magnetographs ordered by Dr. C. H. Vogel for the Potsdam Astrophysical Observatory have been constructed, but before verification were lent by Dr. Vogel to the South-Kensington Loan Exhibition, where they are now being exhibited, in a building erected specially by the Commissioners for the purpose.

A set of Magnetographs, constructed in 1860 for the Batavia Observatory, have been returned to England for repair and alterations, and are now undergoing verification.

The following meteorological instruments have been verified, this portion of the work being entrusted to Mr. T. W. Baker, assisted by Messrs. Foster, Constable, and Welch :—

Barometers, Standards	96
„ Marine and Station	106
	202
Aneroids	28
Thermometers, ordinary Meteorological	1410
„ Boiling-point Standards	36
„ Mountain	34
„ Clinical	1560
„ Solar radiation	90
	3130

In addition, 221 Thermometers have been tested at the melting-point of mercury.

10 Standard Thermometers have been calibrated and divided at Kew.

The following is the list of miscellaneous instruments which have been verified :—

Hydrometers	129
Rain-gauges	29
Dial Anemometers (Robinson's)	20

In addition to the Admiralty, Meteorological Committee, and opticians, a number of instruments of various kinds have been verified for the Standards Department and the Inland Revenue Office.

The total increase in the number of instruments verified over last year has been 385, and in fees paid £36 13*s.* 1*d.*

There are now at the Observatory undergoing verification 290 Thermometers, 110 Hydrometers, and 20 Barometers.

London Office for receipt of instruments for verification.—Arrangements have been made with Mr. Strachan, of the Meteorological Office, who now receives instruments for verification at Kew, at 116 Victoria Street, Westminster, and takes charge of them on their return.

A Thermograph and Barograph, purchased by Dr. van der Stok for the Batavia Observatory, are now undergoing verification.

A Tabulating instrument of the most efficient pattern has been purchased and verified for the Zi-ka-Wei Observatory.

Mr. Galton's apparatus for testing Thermometers has received several additions, serving to improve its utility; and a series of experiments have been made with it, the results of which will be laid before the Royal Society.

A new Cathetometer of great accuracy has been constructed and erected against the Mural Quadrant wall.

Two portable Barometers have been cleaned and repaired, in order that they may be used in making a comparison between the Kew and Greenwich Standard Barometers at an early date.

One Sextant has been verified.

Meteorological data have been supplied to Prof. Balfour Stewart, Mr. J. G. Symons, Mr. Lloyd, the Editors of the 'Illustrated London News,' and the 'Times.'

Chronometer Testing.—One Chronometer has been rated for an optician, but no further steps have been taken towards making this a regular branch of the Observatory work.

Pendulum Experiments.—Mr. C. S. Peirce, of the United States Coast Survey, who has recently been making pendulum observations at Berlin, Geneva, and Paris, arrived at the Observatory in June; after having had the necessary fittings put up in the pendulum-room, he erected his appa-

ratus, and made a complete series of vibrations. He has since returned to America.

Instruction given.—Dr. E. van der Stok, Vice-Director of the Batavia Observatory, has received instruction in the use of the self-registering and absolute instruments, both magnetical and meteorological.

Dr. Hamberg, of the Upsala Observatory, received some instruction in the use of Meteorological instruments. Two assistants in the Standards Department received instruction in the manipulation of Thermometers.

Waxed Paper supplied.—Waxed paper has been supplied to the following Observatories :—

Coimbra,	Radcliffe,
Colaba,	Stonyhurst,
Lisbon,	and to
Mauritius,	The Meteorological Office.

Loan Exhibition.—The Committee having been requested by the Science and Art Department to exhibit objects of interest in their possession at the Loan Collection of Scientific Apparatus, all the instruments either of superseded patterns or duplicates which could be spared without suspending the work of the Observatory were put in order at the expense of the Department, and placed in the galleries at South Kensington. Thirty-one articles (enumerated in the following list) are exhibited.

The Kew Photoheliograph.
Stand with 5 Photographs of the Sun, taken with the Kew Heliograph, and 1 Photograph of a Scale.
Photographic self-registering Declination Instrument.
Photographic self-registering Horizontal-Force Instrument.
Ronalds's Photo-Barograph.
Balance Anemometer.
Ronalds's Electrical Apparatus and Collector.
Kreil's Barograph.
Electrical Machine used by Ronalds.
Ronalds's Rain-and-Vapour Gauge.
Eight-haired Saussure's Hydrometer.
Thomson's-divided ring Electrometer and Gauge.
St.-Helena Magnetometers, comprising the instruments for
Declination,
Bifilar,
Vertical Force.
Declination-Compass used by Sir J. Richardson.
Vibration-Apparatus used by Captain Barnett.
Dip-Circle used by Sir J. C. Ross.
Apparatus for swinging Pendulums.
Invariable Pendulum in Vacuum Chamber.
Air-Pump, Stand for Vacuum Chamber, and Telescope with stand.
Gassiot's Rigid Spectroscope and Lamp.
Quadrant by Butterfield, of Paris.
Kew Pattern Dip-Circle.
Portable Unifilar Magnetometer.

Hodgkinson's Actinometer.
Model of Mr. Galton's Sextant-testing Apparatus.
Model of Mr. Cooke's „ „ „
Two engravings of Kew pattern Magnetographs, in frame.

The Société Française de Photographie having made application to the Committee for assistance in their exhibition of objects illustrating the adaptation of photography to scientific purposes, a set of curves, magnetical and meteorological, together with a few prints from the solar negatives, were forwarded to Paris, where they were exhibited in the Palais de l'Industrie.

Workshop.—The several pieces of Mechanical Apparatus, such as the Whitworth Lathe and the Planing Machine, procured by Grants from either the Government-Grant Fund or the Donation-Fund, for the use of the Kew Observatory, have been kept in thorough order; and many of them are in constant, and others in occasional use at the Observatory.

Library.—During the year the Library has received as presents the publications of

11 English Scientific Societies and Institutions,
27 Foreign and Colonial Scientific Societies and Institutions,

and numerous pamphlets from various individuals. A few standard works of reference have been purchased, and a number of periodicals bound.

Observatory and Grounds.—H.M. Commissioners of Woods and Forests have painted the exterior of the building and put the roof into thorough repair.

The gravelled footway, mentioned in the last Report, has also been made across the Old Deer Park to the Observatory.

During the high tides of last winter the Thames overflowed its banks in the neighbourhood of the Observatory, and the basement was flooded, but no damage was done to any of the instruments.

A new well has been sunk to the north of the building, the old one being contaminated by drainage during the floods.

Staff.—The Staff employed at Kew are as follows:—Mr. G. M. Whipple, B.Sc., Superintendent; T. W. Baker, First Assistant; J. W. Hawkesworth, J. Foster, H. M'Laughlin, F. G. Figg, E. G. Aldridge, R. W. F. Harrison, E. Constable, T. Gunter, and P. Welch. Mr. Samuel Jeffery resigned the appointment of Superintendent at the end of February, and the Committee, at their last meeting, have appointed Mr. G. M. Whipple, formerly First Assistant, to fill his post.

Mr. J. E. Cullum, having been made Superintendent of the Valencia Observatory, resigned his appointment in December. Messrs. A. B. Deane, J. Lawrence, E. Hux, and G. A. Henniker have also resigned during the year.

Committee.—The Committee is constituted as follows:—

Gen. Sir E. Sabine, K.C.B., *Chairman.*

Mr. De La Rue.	The Earl of Rosse.
Capt. Evans.	Mr. R. H. Scott (*Hon. Sec.*).
Mr. F. Galton.	Major-Gen. W. J. Smythe.
Mr. Gassiot.	Lieut.-Gen. Strachey.
Rear-Adm. Richards.	Mr. E. Walker.

Visitors.—The Observatory has been honoured by the presence, among others, of:—

The Members of the Permanent Committee of the Vienna Congress, viz.:—Profs. Buys Ballot, Bruhns, Cantoni, Mohn, and Wild.
British Horological Institute.
Senhor Capello.
Mr. R. J. Ellery.
Mons. J. C. Houzeau.
Rev. H. Howlett.
Dr. Kundt.
Dr. Lemström.
Mr. D. Milne-Home.
Sir Rawson Rawson.
Dr. Recknagel.
Mr. A. Cowper Ranyard.
Dr. Sohncke.
M. Albert Tissandier.
M. Gaston Tissandier.
Prof. von Oettingen.
Baron von Wrangell.

The following is the Balance-sheet of the Observatory for the year; and it will be seen that the finances are in a fairly satisfactory condition:—

Treasury Receipts and Payments account from November 1, 1875, to October 31, 1876.

RECEIPTS. *Dr.*

	£	s.	d.
To Balance from 1874–75	585	10	3
Royal Society (Gassiot Trust) £249 19 8			
" " 248 18 8			
	498	18	4
Meteorological Committee 162 10 0			
" " 162 10 0			
" " 162 10 0			
" " 162 10 0			
	650	0	0
Meteorological Committee, for Postages &c. 20 14 1			
" " Pagoda Observations 5 13 0			
	26	7	1
Payment for Instruments by Commission	435	15	0
Sale of Waxed Paper	66	15	0
Verification Fees, Magnetic Instruments 33 2 0			
" " Met. Com., B. T. Inst. 41 2 6			
" " " Admiralty 32 7 6			
" " " Commissions 68 15 6			
" " Opticians &c. 205 1 1			
Sale of Standard Thermometers 9 0 0			
Payments for Copying Registers 29 17 6			
	419	6	1
Mr. De La Rue for Sun-work	109	13	0
Mr. Peirce for Pendulum Expenses	3	1	9
Sale of Photographic Residues	6	2	3
	£2801	8	9

PAYMENTS. *Cr.*

	£	s.	d.
By Salaries and extra work	1101	1	4
Rent of Land £11 10 0			
Fuel and Gas 59 7 1			
Furniture and Fittings 58 1 7			
Chandlery &c. 19 4 1			
Painting and Repairs 24 16 3			
	172	19	0
Printing and Stationery 49 9 2			
Postages 9 7 7			
Library 11 5 5			
Messenger and Housekeeper 52 0 0			
Porterage and Contingencies 36 5 2			
	158	7	4
Instruments purchased on Commission	511	3	2
Postages and Payments on behalf of Meteorological Committee	13	7	8
Purchase of Waxed Paper, Packing ditto, &c.	86	7	10
Chemicals 33 13 5			
Ice and Carbonic-Acid Gas 15 9 1			
Anemograph Sheets 2 8 9			
Repair of Instruments and Purchase of New ditto 38 18 7			
Carpenters' Work and Sundries 22 0 2			
	112	10	0
Sun-work Expenses	106	4	6
Pendulum Expenses	19	4	7
Expenses on behalf of Loan Scientific Exhibition 18 16 1			
" " Mr. Galton's Experiment 0 5 2			
	19	1	3
London and Westminster Bank 386 0 7			
London and County Bank 93 0 0			
Cash in hand 22 1 6			
Balance	501	2	1
	£2801	8	9

November 15, 1876. Examined, compared with the vouchers, and found correct. (Signed) W. J. SMYTHE, *Auditor.*

ASSETS.

	£	s.	d.
By Balance as per Statement	501	2	1
Verification Fees due	31	17	5
Standard Thermometers sold	4	7	6
" " in stock (valued at)	107	16	0
Waxed Paper sold	4	15	0
" " in stock	41	5	0
Meteorological Committee Sundries	0	16	4
Mr. De La Rue for Sun-work	6	4	6
Mr. Galton	3	8	2
Loan Scientific Exhibition	18	16	1
	£720	8	1

LIABILITIES.

	£	s.	d.
To Gas and Fuel	11	4	5
Chemicals	1	8	0
Instruments and Apparatus	10	9	0
Stationery and Printing	1	2	6
Library	1	2	0
Balance	695	2	2
	£720	8	

(Signed) ROBERT H. SCOTT, *Hon. Sec.*

APPENDIX.

Magnetic Observations made at the Kew Observatory, Lat. 51° 28′ 6″ *N., Long.* 0^{h} 1^{m} 15^{s}·1 *W., for the year October* 1875 *to September* 1876.

The observations of Deflection and Vibration given in the annexed Tables were all made with the Collimator Magnet marked K C1, and the Kew 9-inch Unifilar Magnetometer by Jones, the property of the Magnetic Office, directed by General Sir E. Sabine.

The Declination observations have also been made with the same Magnetometer, Collimator Magnet N E being employed for the purpose.

The Dip observations were made with Dip-circle No. 33, the needles 1 and 2 only being used; these are $3\frac{1}{2}$ inches in length.

The results of the observations of Deflection and Vibration give the values of the Horizontal Force, which, being combined with the Dip observations, furnish the Vertical and Total Forces.

These are expressed in both English and metrical scales—the units in the first being one foot, one second of mean solar time, and one grain; and in the other one millimetre, one second of time, and one milligramme, the factor for reducing the English values to metric values being 0·46108.

By request, the corresponding values in C.G.S. measure are also given.

The value of log π^2K employed in the reduction is 1·64365 at temperature 60°.

The induction-coefficient μ is 0·000194.

The correction of the magnetic power for temperature t_0 to an adopted standard temperature of 35° Fahr. is

$$0{\cdot}0001194\,(t_0-35)+0{\cdot}000{,}000{,}213\,(t_0-35)^2.$$

The true distances between the centres of the deflecting and deflected magnets, when the former is placed at the divisions of the deflection-bar marked 1·0 ft. and 1·3 ft., are 1·000075 ft. and 1·300097 ft. respectively.

The times of vibration given in the Table are each derived from the mean of 12 or 14 observations of the time occupied by the magnet in making 100 vibrations, corrections being applied for the torsion-force of the suspension-thread subsequently.

No corrections have been made for rate of chronometer or arc of vibration, these being always very small.

The value of the constant P, employed in the formula of reduction $\frac{m}{X}=\frac{m'}{X'}\left(1-\frac{P}{r_0^2}\right)$, is −0·00179.

In each observation of absolute Declination the instrumental readings have been referred to marks made upon the stone obelisk erected about

a quarter of a mile north of the Observatory as a meridian mark, the orientation of which, with respect to the Magnetometer, was determined by the late Mr. Welsh, and has since been carefully verified.

The observers' initials refer—W to Mr. G. M. Whipple, and F to Mr. F. G. Figg.

Observations of Deflection for Absolute Measure of Horizontal Force.

Month.	G. M. T.	Distances of Centres of Magnets.	Temperature.	Observed Deflection.	$\log\frac{m}{X}$. Mean.	Observer.
1875.	d h m	foot.		° ′ ″		
October	26 12 31 P.M.	1·0	53·6	15 45 39		W.
		1·3	.....	7 6 25	9·13461	,,
	2 17 ,,	1·0	54·0	15 44 38		,,
		1·3	.....	7 6 2		,,
November	23 12 32 P.M.	1·0	46·2	15 44 58		W.
		1·3	.....	7 6 6	9·13395	,,
	2 27 ,,	1·0	46·1	15 44 47		,,
		1·3	.....	7 6 1		,,
December	20 12 44 P.M.	1·0	49·4	15 45 13		W.
		1·3	.....	7 6 18	9·13414	,,
	2 16 ,,	1·0	49·0	15 44 17		,,
1876.		1·3	.....	7 5 51		,,
January	25 12 10 P.M.	1·0	40·3	15 45 58		W.
		1·3	.....	7 6 25	9·13380	,,
	2 9 ,,	1·0	42·4	15 44 38		,,
		1·3	.....	7 5 59		,,
February	23 12 34 P.M.	1·0	52·5	15 44 28		W.
		1·3	.....	7 5 54	9·13430	,,
	2 5 ,,	1·0	52·2	15 44 42		,,
		1·3	.....	7 6 12		,,
March	27 1 10 P.M.	1·0	43·6	15 48 20		F.
		1·3	.....	7 7 35	9·13520	,,
	2 38 ,,	1·0	45·6	15 47 17		,,
		1·3	.....	7 7 12		,,
April	25 12 57 P.M.	1·0	64·2	15 43 7		F.
		1·3	.....	7 5 18	9·13431	,,
	2 43 ,,	1·0	65·8	15 42 21		,,
		1·3	.....	7 5 4		,,
May	26 12 53 P.M.	1·0	56·5	15 42 52		F.
		1·3	.....	7 5 20	9·13368	,,
	2 29 ,,	1·0	56·6	15 42 17		,,
		1·3	.....	7 4 57		,,
June	27 12 33 P.M.	1·0	74·6	15 40 12		F.
		1·3	.....	7 4 0	9·13383	,,
	2 46 ,,	1·0	79·5	15 39 29		,,
		1·3	.....	7 3 38		,,
July	26 12 42 P.M.	1·0	79·8	15 38 24		F.
		1·3	.....	7 3 20	9·13335	,,
	2 33 ,,	1·0	83·1	15 37 32		,,
		1·3	.....	7 2 49		,,
August	28 12 27 P.M.	1·0	67·9	15 40 42		F.
		1·3	.....	7 4 21	9·13368	,,
	2 27 ,,	1·0	69·9	15 40 53		,,
		1·3	.....	7 4 7		,,
September	26 12 22 P.M.	1·0	67·9	15 41 0		F.
		1·3	.....	7 4 33	9·13371	,,
	2 33 ,,	1·0	69·1	15 40 45		,,
		1·3	.....	7 4 5		,,

Vibration Observations for Absolute Measure of Horizontal Force.

Month.	G. M. T.	Temperature.	Time of one Vibration.	Log mX. Mean.	Value of m.	Observer.
1875.	d h m	°	secs.			
October	26 11 55 A.M.	51·6	4·6179	0·31403	0·53005	W.
	26 2 45 P.M.	53·0	4·6235			,,
November	23 12 2 P.M.	44·6	4·6255	0·31278	0·52888	W.
	23 3 1 P.M.	47·0	4·6252			,,
December	20 12 12 P.M.	47·9	4·6261	0·31302	0·52915	W.
	20 2 57 P.M.	49·2	4·6253			,,
1876.						
January	25 11 33 A.M.	37·0	4·6233	0·31272	0·52876	W.
	25 2 45 P.M.	43·1	4·6254			,,
February	23 11 57 A.M.	50·6	4·6260	0·31290	0·52918	W.
	23 2 34 P.M.	51·3	4·6274			,,
March	27 12 2 P.M.	41·4	4·6206	0·31330	0·52997	F.
	27 3 27 P.M.	46·6	4·6232			,,
April	25 12 6 P.M.	61·8	4·6293	0·31320	0·52936	F.
	25 3 28 P.M.	65·8	4·6285			,,
May	26 12 9 P.M.	56·0	4·6286	0·31212	0·52832	F.
	26 3 11 P.M.	56·7	4·6265			,,
June	27 11 44 A.M.	72·8	4·6330	0·31319	0·52907	F.
	27 3 23 P.M.	82·0	4·6344			,,
July	26 11 52 A.M.	78·3	4·6357	0·31297	0·52864	F.
	26 3 20 P.M.	84·6	4·6356			,,
August	28 11 33 A.M.	66·9	4·6338	0·31238	0·52848	F.
	28 3 11 P.M.	69·2	4·6338			,,
September	26 11 25 A.M.	65·3	4·6323	0·31266	0·52867	F.
	26 3 16 P.M.	67·5	4·6305			,,

Declination Observations.

Month.	G. M. T.	Uncorrected.		Corrected for Torsion.		Observer.
		Observation.	Monthly Mean.	Observation.	Monthly Mean.	
1875.	d h m	° ′ ″	West.	° ′ ″	West.	
October	27 12 34 P.M.	19 45 16		19 45 16		W.
	28 12 31 „	19 38 1		19 34 0		„
	29 12 20 „	19 35 24	19 39 34	19 34 42	19 37 59	„
November	24 12 13 „	19 34 41		19 34 41		W.
	25 12 41 „	19 34 18	19 34 30	19 33 53	19 34 17	„
December	21 12 48 „	19 34 57		19 33 33		W.
	23 12 38 „	19 32 44	19 33 51	19 33 51	19 33 42	„
1876.						
January	26 12 37 „	19 32 48		19 35 29		W.
	27 12 6 „	19 33 18	19 33 3	19 29 43	19 32 36	„
February	24 12 13 „	19 35 22		19 36 24		W.
	26 12 45 „	19 37 46	19 36 34	19 37 5	19 36 45	F.
March	28 12 44 „	19 32 46		19 34 5		F.
	29 12 27 „	19 37 28		19 39 27		„
	31 12 35 „	19 39 40	19 36 38	19 37 21	19 36 58	„
April	26 12 37 „	19 33 43		19 34 6		F.
	27 12 39 „	19 29 10		19 29 33		„
	28 12 40 „	19 32 3	19 31 39	19 32 3	19 31 54	„
May	27 12 37 „	19 31 0		19 29 24		F.
	29 12 32 „	19 31 16	19 31 8	19 33 39	19 31 32	„
June	28 12 22 „	19 36 39		19 34 48		F.
	29 12 33 „	19 32 26	19 34 33	19 32 8	19 33 28	„
July	27 12 37 „	19 33 32		19 32 49		F.
	28 12 25 „	19 29 30	19 31 31	19 29 52	19 31 21	„
August	29 12 21 „	19 27 28		19 29 56		F.
	30 1 11 „	19 35 10	19 31 19	19 33 18	19 31 37	„
September.....	27 12 28 „	19 29 29		19 32 1		F.
	28 12 31 „	19 31 30	19 30 30	19 32 55	19 32 28	„

Dip Observations.

Month.	G. M. T.	Needle.	Dip.	Observer.
1875.	d h m	No.	° ′	
Oct.	25 3 13 P.M.	1	67 48·40	F.
	3 13 „	2	47·94	„
	26 3 22 „	1	50·87	W.
	3 24 „	2	48·78	„
	Mean...	.....	67 49·00	
Nov.	24 3 0 P.M.	1	67 47·84	W.
	2 58 „	2	46·60	„
	25 3 8 „	1	48·44	F.
	3 5 „	2	47·53	„
	Mean...	.....	67 47·60	
Dec.	21 2 41 P.M.	1	67 47·81	W.
	2 42 „	2	46·12	„
	22 3 3 „	1	48·38	F.
	3 5 „	2	46·56	„
	Mean...	.....	67 47·22	
1876.				
Jan.	26 2 57 P.M.	1	67 47·75	W.
	2 58 „	2	46·93	„
	27 3 4 „	1	47·50	F.
	3 2 „	2	46·88	„
	Mean...	.....	67 47·26	
Feb.	24 3 17 P.M.	1	67 47·56	F.
	3 19 „	2	47·50	„
	28 3 10 „	1	47·81	„
	3 13 „	2	46·93	„
	Mean...	.....	67 47·45	
Mar.	28 3 17 P.M.	1	67 48·12	F.
	3 20 „	2	47·19	„
	29 3 1 „	1	48·44	„
	3 3 „	2	47·25	„
	Mean...	.....	67 47·75	

Month.	G. M. T.	Needle.	Dip.	Observer.
1876.	d h m	No.	° ′	
Apr.	26 3 2 P.M.	1	67 47·37	F.
	3 0 „	2	46·69	„
	28 3 37 „	1	47·62	„
	3 55 „	2	47·00	„
	Mean...	.....	67 47·17	
May	29 2 52 P.M.	1	67 47·06	F.
	2 52 „	2	46·00	„
	30 3 0 „	1	46·81	„
	2 59 „	2	45·75	„
	Mean...	.....	67 46·41	
June	28 3 1 P.M.	1	67 46·75	F.
	3 1 „	2	46·06	„
	29 2 56 „	1	47·06	„
	2 57 „	2	46·43	„
	Mean...	.....	67 46·57	
July	27 3 29 P.M.	1	67 46·00	F.
	3 32 „	2	45·62	„
	28 3 6 „	1	46·68	„
	3 10 „	2	45·69	„
	Mean...	.....	67 46·00	
Aug.	29 2 52 P.M.	1	67 45·38	F.
	2 53 „	2	45·31	„
	30 2 53 „	1	46·06	„
	2 52 „	2	46·06	„
	Mean...	.....	67 45·70	
Sept.	27 3 6 P.M.	1	67 48·25	F.
	3 6 „	2	47·38	„
	28 3 6 „	1	46·43	„
	3 7 „	2	46·31	„
	29 3 3 „	1	46·56	„
	3 1 „	2	45·68	„
	Mean...	.....	67 46·77	

Magnetic Intensity.

Month.	English Units.			Metric Units.			C.G.S. Measure.		
	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.
1875. October ...	3·8879	9·5348	10·2970	1·7926	4·3963	4·7478	0·1793	0·4396	0·4748
November	3·8852	9·5172	10·2797	1·7914	4·3882	4·7398	0·1791	0·4388	0·4740
December..	3·8854	9·5148	10·2776	1·7915	4·3871	4·7388	0·1791	0·4387	0·4739
1876. January...	3·8856	9·5157	10·2783	1·7916	4·3875	4·7391	0·1792	0·4387	0·4739
February .	3·8842	9·5135	10·2759	1·7909	4·3865	4·7381	0·1791	0·4386	0·4738
March ...	3·8820	9·5104	10·2721	1·7899	4·3851	4·7363	0·1790	0·4385	0·4736
April	3·8854	9·5144	10·2771	1·7915	4·3869	4·7386	0·1791	0·4387	0·4739
May	3·8835	9 5036	10·2664	1·7906	4·3820	4·7337	0·1791	0·4382	0·4734
June	3·8876	9·5148	10·2785	1·7925	4·3871	4·7393	0·1792	0·4387	0·4739
July	3·8887	9·5133	10·2773	1·7930	4·3864	4·7387	0·1793	0·4386	0·4739
August ...	3·8846	9·5008	10·2643	1·7911	4·3807	4·7327	0·1791	0·4381	0·4733
September	3·8857	9·5120	10·2750	1·7916	4·3858	4·7376	0·1792	0·4386	0·4738