

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

CXXV.]

JUNE, 1876.

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or 5s. per ann. post free.]

SCIENCE AT SOUTH KENSINGTON.

GENERAL.

THE above title, now so frequent in the daily papers, from *The Times* downwards, is a novelty, and universally regarded as such. Yet what a sham does this very fact of the novelty of Science at South Kensington prove the so-called Science and Art Department to have originally been. A fuss is being made about the cost of the loan exhibition of scientific apparatus, which, it is said, will be £25,000—but is that so very large a sum out of the Science and Art vote of £286,000? why, it is not one-tenth. Several other organisations having been grouped under the Science and Art Department, it is not easy to ascertain what the South Kensington establishment *alone* costs; but surely if the relative attention and funds devoted to each were known, it never would have been called the Science and Art Department, for even the “Art and Science Department” would have implied far greater attention to Science than it ever received. We hold that for years the title was utterly misleading, and we submit that the establishment ought to have been called the Art Department, for as far as practical work is concerned, Science at South Kensington was for many years *Vox et præterea nihil*.

At last, however, and for a reason upon which we need not dwell, a push has been made, a loan collection of scientific apparatus has been formed, and there have been conferences, demonstrations, &c., while we are told there is to be a scientific library established, costing thousands of pounds, and sundry other schemes are shadowed forth. To any ordinary mortal it would appear a farce to spend money in starting a rival to the British Museum Library, instead of appropriating it to the improvement (and as regards Science it sadly needs it) of that National Library, which South Kensington may cripple, but which even its great votes will never enable it to surpass.

However we are not politicians, and must simply take the goods the gods provide.

We, therefore, proceed to consider the meteorological portion of the loan exhibition.

The first essential of a collection of apparatus is a good catalogue, and this is notoriously absent. A bulky volume was indeed ready for the opening day, but on the cover it was stated to be "under revision," and truly it needed it. No revised edition has yet appeared, and the obviously wise plan of asking one expert in each branch, Astronomy, Physics, Meteorology, &c., to take absolute charge of his own portion of the catalogue, not having been adopted, we have no very high anticipations of the second edition, for there is no one person living who is competent to take entire charge. That the exhibitors are often themselves incompetent to describe that which they have sent is proved by a score of errors in the first edition evidently solely due to the contributors.

The exhibition is, however, open, the collection is undeniably a grand one, and there really are very many objects of high interest. We, therefore, purpose devoting considerable space to the subject, and to the best of our ability, not only describing, but also giving engravings of, the apparatus exhibited; the latter being, as most persons are aware, a very costly matter.

Here, however, we at once come upon a difficulty arising from the preponderance of the art element in the direction. Proprietors of artistic productions have ideas as to copyright, &c., very different from those entertained by the followers of science. Only a mind trained in an art school could have framed one of the conditions under which objects are exhibited at South Kensington, viz. :—

6. *Photographs, copies, or casts, are made of such loans as may be useful for instruction in Schools of Art, unless the lender objects in writing. Two copies of each photograph are sent to the lender. Permission to copy or photograph objects on loan is not granted to private persons without the sanction in writing of the lender.*

We have been obliged to meet this difficulty by issuing to all the Exhibitors in the Meteorological section the following circular :—

LOAN EXHIBITION OF SCIENTIFIC INSTRUMENTS, SOUTH KENSINGTON.

The Editor of the *Meteorological Magazine* presents his compliments to———, and will be much obliged if he will grant him permission to engrave, in the *Meteorological Magazine*, the apparatus which he exhibits at South Kensington.

The Editor will have the pleasure to forward a copy of the *Magazine* as soon as published.

Please address—

The Editor, *Meteorological Magazine*,
62, Camden Square,
London, N.W.

To those conversant with the scientific men of the present day it is almost needless to say that the consent has been immediately granted, and, moreover, that offers of the loan of engravings have been very

frequent. Still, there are several contributors residing at such distances that their replies cannot reach us in time for the present issue, and consequently we cannot make the following article quite so systematic and exhaustive as we should have done.

We desire also to record (and this seems the most appropriate place) our thanks to Major Festing, R.E., and the other officials in charge of the Exhibition, for the assistance which they have granted us in the present undertaking.

BAROMETERS.

ANTIQUE BAROMETERS.

Only one of the old barometers exhibited appears to have the date of manufacture marked upon it. There is in one of the Italian cases a double barometer (somewhat like fig. 1) bearing the inscription—

“Tubo di Torricelli,
Firenze, An. 1644.”

but we do not think that any person looking at the instrument, would credit its being two and a quarter centuries old. The cistern, a plain glass cylinder, is fixed, so are the tubes, and so is the scale; there is, therefore, no arrangement for correcting for variation of level of the mercury in the cistern. The one tube being merely hermetically sealed in the usual manner, and the other terminated with a bulb about $1\frac{3}{4}$ inch in diameter, intimates that the instrument was constructed to see if any difference of level resulted from the different area of vacuum above the column.

Two of Sir S. Moreland's Diagonal Barometers are exhibited, one [2807] in the simple form represented in many old works and in fig. 2, was made by Whitehurst, of Derby, and is exhibited by the Committee of the Royal Museum, Peel Park, Salford. We cannot in the least understand the graduations on this instrument; they are neither inches nor parts of an inch. The other [3026] is sent from the Hydrographic Office of the Admiralty, and consists of a frame about 30 in. broad by 42 in. high, and covered with a mass of printing, engravings, and moveable dials, showing besides atmospheric pressure, temperature, and the degree of humidity, (1) the moon's age, (2) its increase and decrease, and (3) how many hours and minutes it shines. Likewise (4) the times of high water at London Bridge. The opening on the middle table shows (5) the fixed feasts and remarkable days; the second opening shows (6) the sun's rising; the third (7) the sun's setting; the fourth (8) the day's length; the fifth (9) the break of day for every 15th day of the month; the sixth (10) the Zodiacal signs; the seventh (11) the sun's declination in degrees and minutes whether to the N. or S., and likewise (12) its place in degrees and minutes for every other day of each month. The eighth opening is (13) a table of equation of days in minutes and seconds for every other day of each month, which shows how much faster or slower a well-regulated clock or watch should be than a true sun-dial. The opening to the

right shows (14) the days of the month for every day in the week. The tables on the outside give (15) the date of Easter for 100 years in advance, from which all other movable feasts are easily found by reference to a table on the left (16). There is also at the right (17) a regal table giving the date in years, months and days when each king of England began to reign, also the length of his reign in years, months and days, and the place of his burial. The date of this curious instrument is about 1750, and it was made by Watkins and Smith, of London.

It may be well to mention that this diagonal form was adopted because as the atmospheric pressure balances vertical height, it is obvious that with an inclined tube an inch of vertical height becomes several inches in length. In the latter instrument each barometric inch is about seven inches long. This pattern has been abandoned, because the readings were vitiated by excessive repulsion and friction against the tube.

Pillischer, of Bond Street, exhibits a fine old Dutch Barometer, by Reballio [2797], combining a syphon and long range barometer, together with thermometer and hygrometer.

Dr. Henry de Saussure, of Geneva, sends a Mountain Barometer, by De Luc, which was used by H. Benedict de Saussure.

MERCURIAL STANDARDS.

The finest barometer is undoubtedly Casella's Observatory Standard (fig. 3), with a quarter of a hundredweight of mercury, a column of nearly an inch internal diameter, and a fixed cubical cistern. The alteration of the level of the mercury in the cistern is guarded against in the most perfect manner by making the scales adjustable, so that while the one end of each scale is adjusted to contact with the mercury, the other carries the graduation and the vernier. There are two scales, inches and millimetres, each, of course, with ivory point and vernier.

FORTIN'S BAROMETERS.

This construction is that most generally employed by the private observers of this country. The divisions are engraved on the brass tube which protects the instrument, the zero of the divisions being a fixed ivory point. The lower part of the cistern of barometers of this pattern being made of flexible leather, the capacity of the cistern can be so varied by turning the screw at its base, that the level of the mercury can at all times be brought to contact with the zero point.

Negretti and Zambra send two, one of them (fig. 4), is a very fine specimen, the best of the class. Others are exhibited by the Meteorological Society [2783], Adie [2790, 2791, 2792], Elliott [2806], and Pastorelli [2809].

KEW PATTERN BAROMETERS.

It is evident that if the area of the tube of a barometer be 0.1 inch, and that of the cistern 1 inch, a fall of the mercury of an inch would

raise the level of the cistern 0·1 inch. We have shown above that in Casella's barometer this is corrected for, by moving the scale until its lower extremity is in contact with the mercury; also that in the Fortin barometer the scale is fixed, and the mercury moved up (or down) to it. We have now to deal with another mode of neutralizing the difficulty. In the Kew pattern barometer the area of the cistern and of the tube are accurately determined, their ratio to each other computed, and the divisions of the scale so contracted that the true height corrected for the variable height of the mercury in the cistern is indicated. The inches on the scale are therefore not inches, but the representatives of inches.

The avoidance of the trouble of adjusting the ivory point to the mercury, or the mercury to the ivory point, has induced the very general employment of this form, and for marine purposes it is the best and most simple. It is also by far the best for unskilled or careless observers on land, but it seems too generally forgotten that while with a Fortin barometer the loss of a little mercury is of no consequence, with the Kew pattern the slightest leakage from the cistern is fatal; and the instrument is so screwed up by the makers that the observers have no means of knowing whether their barometer is in order or not, except by comparing it with others. We believe that this accident rarely occurs, but skilled observers like to be able to ascertain independently the accuracy of their observations. Instruments of this pattern are shown by the Meteorological Committee [2776], Pastorelli [2787 and 2808], and Adie [2794].

GUN BAROMETERS.

These only differ from the above in the tube being cased with India-rubber, to guard against concussion from the firing of heavy artillery. One (fig. 5), is exhibited by Negretti and Zambra, who originally designed, and made, them for, and with the assistance of, Admiral Fitzroy. The Meteorological Committee exhibit another of the same pattern made by Adie [2788].

MINING BAROMETERS.

Elliott Brothers send a Kew pattern Barometer, [3385] in wood, of the kind usually employed for mines, and Davis, of Derby, is reported to have sent another [3389*b*], but we have not seen it.

MOUNTAIN MERCURIAL BAROMETERS.

The Scottish Meteorological Society exhibit, along with the rest of their instruments, [2801] Mr. Stevenson's portable, but very rough and heavy Iron Barometer, as improved by Sang, in which the reading is obtained by a wooden float, resting on the short leg of the syphon (fig 6). The instrument is thus described* :—

“At a meeting of the Scottish Meteorological Society in April last, a letter from New South Wales was read, stating the impossibility of

* Journal of the *Scottish Meteorological Society*, Vol. 4, p. 265.

conveying barometers in safety to remote stations in that colony, and asking whether the Society could suggest some good form of portable instrument. I suggested for that purpose the employment of an iron barometer, and a Committee was appointed to consider the proposal ; and I have since had one made of malleable iron tube. What appeared the best form was to have the upper working part of the barometer carefully turned, so as to be of strictly accurate form, and to have this part of larger diameter than that of the lower working tube, so as to enlarge the scale. On the lower or shorter bend of the iron tube there should be two stopcocks ; the lower one being placed so as to confine, when the instrument was to be moved, the whole of the mercury, excepting, say, 1 inch of the column. By this arrangement, when the mercury is made to occupy the vacuum at the top of the long branch, and the lower stopcock is shut, no air can mix with the mercury ; while by shutting the upper stopcock, the remaining inch of mercury is prevented from escaping, and the air that has mixed with it on the journey, will be allowed to escape before the instrument is used by opening the upper stopcock.

On showing the iron barometer to my friend Mr. Edward Sang, F.R.S.E., he suggested other two stopcocks and a plug-hole, an arrangement which seems to me admirably suited for iron barometers, and which he had originally thought of for glass tubes.

Mr. Sang thus describes his arrangement : " All the stopcocks being open, and the plug at D out, fill in mercury till it begin to escape at D ; shut C, and fill to above A ; shut A and B, put in the plug D, and open C. The float should then show the true reading as compared with a standard instrument. In this way a reading can always be obtained at the most inaccessible station, as accurate as when the instrument left the maker's hands.

" If air be suspected between the top of the mercury and B, shut C, open B (A remaining shut all the while) ; then the mercury in the space A B will descend to fill the tube, and the expanded air will rise to A. Shut B, take out the plug D, to allow any mercury to escape ; open C, and see if there be any change in the reading : you may thereby know if there had been any air in the tube. To repeat the process of exhaustion, see that there be plenty of mercury above A, open A to allow the minute quantity of air to escape, shut A and proceed as before."

Water or oil barometers may be very cheaply and easily constructed if made of iron tube, and the scale may be readily enlarged by increasing the diameter of the upper working portion, so as to indicate still more clearly sudden changes in the atmospheric pressure.

Two Mountain Barometers, one on Fortin's plan [2795] (fig. 7) and one on Gay Lussac's plan [2796] are exhibited by Adie ; a Kew pattern one by Pastorelli, and two old patterns are shown by Mr. Symons ; one of which is represented in fig. 8.

Capt. George exhibits (in the Geographical Society's case) [3029] one of his Mountain Barometers, filled by the spiral cord method, whereby the barometer tube being carried empty is less liable to

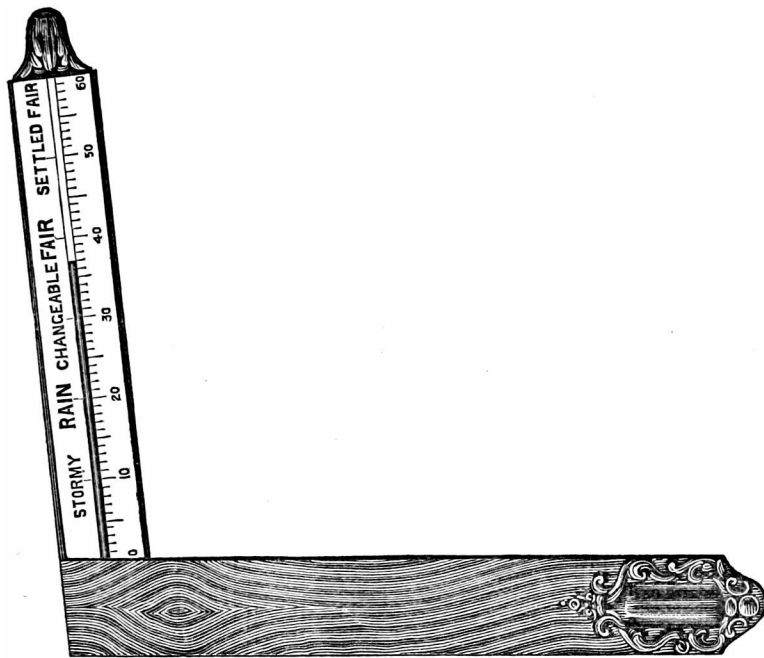
ANTIQUE BAROMETERS.

Fig 1.



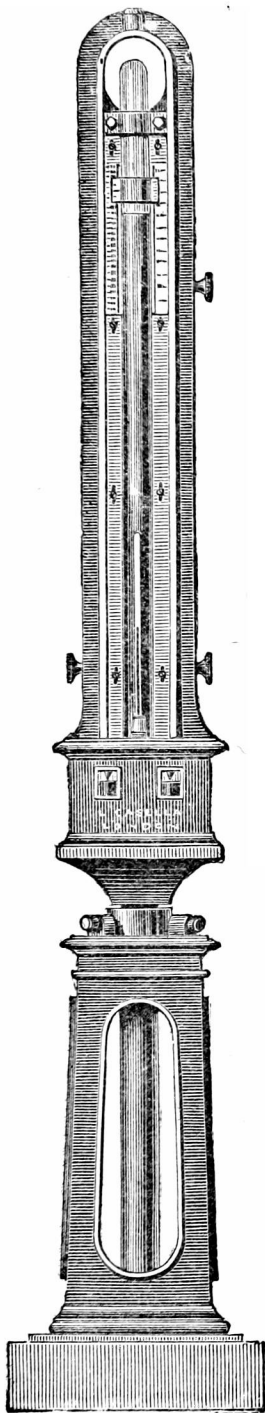
Torricelli.

Fig. 2.



Sir S. Moreland's Diagonal.

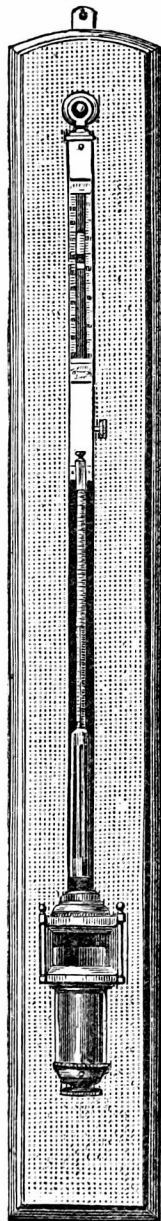
Fig. 3.



Casella's Observatory
Standard.

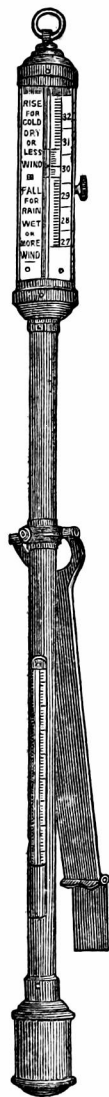
STANDARD BAROMETERS.

Fig. 4.



Fortin's
Standard.

Fig. 5.



Negretti's
Gun
Barometer

MOUNTAIN BAROMETERS.

Fig. 7.

Fig. 6.

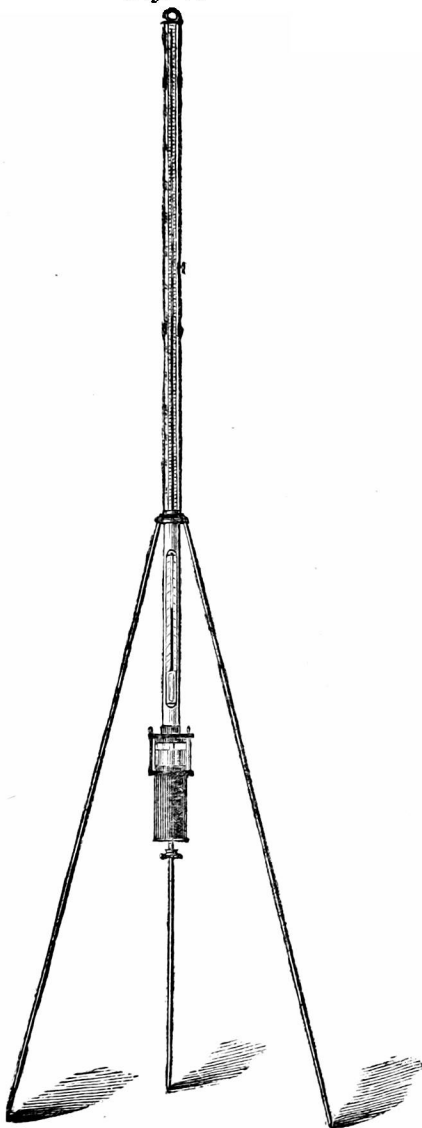
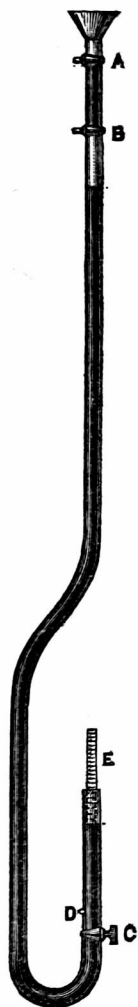
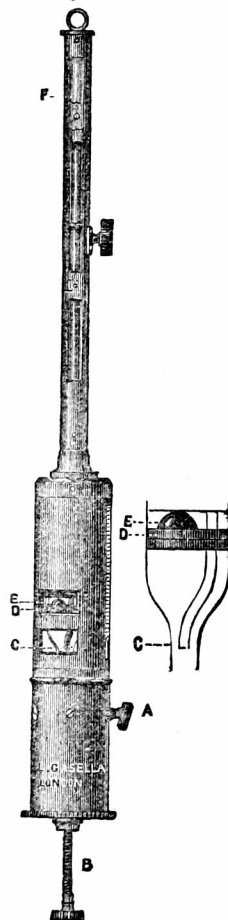


Fig. 8.



Fig. 9.



- Fig. 6.*—Stevenson's Iron Barometer.
Fig. 7.—Fortin's Mountain Barometer.
Fig. 8.—Old Mountain Barometer.
Fig. 9.—Casella's Mariotti Barometer.

ANEROID BAROMETERS.

Fig. 10.

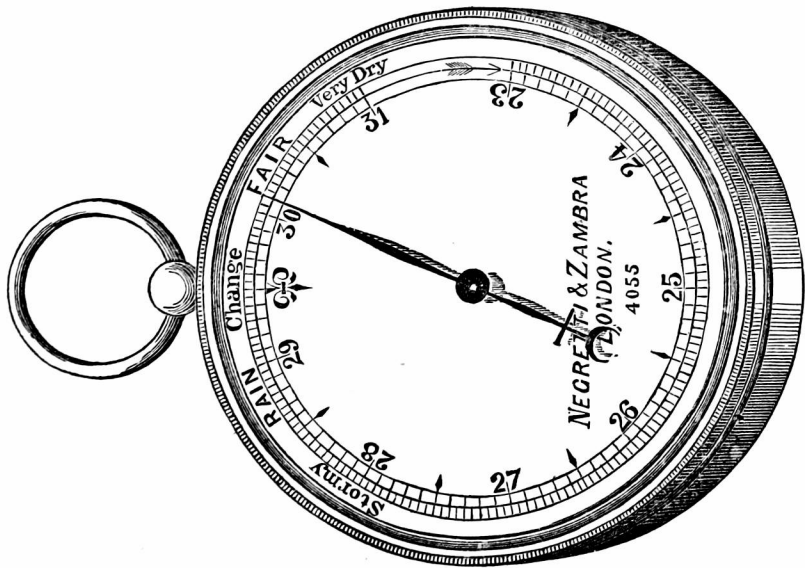


Fig. 11.

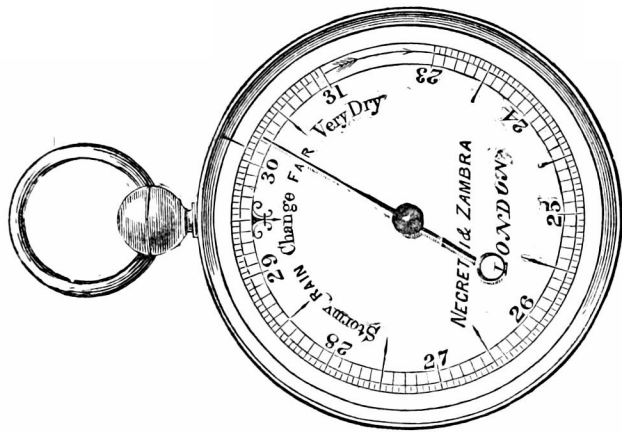
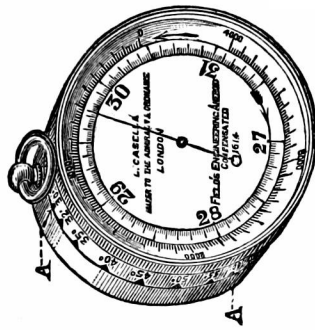


Fig. 12.



breakage; another will be found along with the mountain barometers.

Casella sends one of Macneill's Portable Mariotti Barometers [2809c] (fig. 9), which is thus described:—

"This instrument combines in itself the probability of the Aneroid and the constant correctness of the Standard Barometer. Its action depends on the well-known laws of Mariotti and Boyle, applied to the expansion and compression of air. It consists of a short centre glass tube, a lower open air tube or bulb, with diaphragm joined to it, with a vulcanite covering for insulation, and a brass tube, or shield, which covers the glass tube, and on which the graduations and figures are engraved. Attached to this is a cistern filled with mercury, which has a stopcock and a coarse screw adjustment.

"The total length is from 12 to 15 inches; but, for convenience of carriage, the cistern may be detached and carried separately.

"The weight and pressure of the atmosphere is determined accurately, at each observation, by an uniform volume of air being admitted and compressed by the advance of the mercury from the cistern to a fixed point, or zero, so that no accumulation of error is possible; and the reading will be equally accurate for all times and for all places.

"It is not necessary that the same quantity of mercury be always used, and it need not be boiled.

"The readings are taken from two points, as in the Fortin's Barometer.

"The scale reads to hundredths of an inch, by means of a vernier, and it is correct and independent of comparison with a Standard Barometer to the .02 of an inch; the corrections for reducing the reading to 32° are the same as in the Standard Barometer.

"The Pocket Barometer is equally accurate at the bottom of the deepest mine and at the top of the highest mountain, as well as at all temperatures, the error at these extremes being no greater than at two consecutive readings at the Sea Level; and thus, for great ranges, or isolated positions, as a standard of reference, this instrument has no equal, and it is in the fact that this really Portable Barometer needs no adjustment that its great merit lies; hence its value to travellers and residents in foreign countries, where a mercurial standard cannot be easily referred to."

ANEROID BAROMETERS.

Negretti and Zambra, as the first persons to reduce aneroids successively to diameters of 2.7 in. and 1.9 in., exhibit specimens of each, which are represented in their actual size in figures 10 and 11.

Pastorelli sends aneroids of various sizes from 9 in. diameter down to 1.9 in. Some of his, mounted like box chronometers, appear to be of high excellence, and are very handsome.

Another handsome form of aneroid is lent by Mr. Washington Moon, the speciality of which is that the spokes of the steering wheel (in a model of which the aneroid is set) turn the index hand.

Goldschmid, of Zurich, sends a variety of aneroids of his very sensitive form, also some on the Weilenmann system [2811—2815]. We cannot at present spare time or space to explain these methods, but

the essential principle is the very excellent one of giving the vacuum box as little work to do as possible.

Pillischer exhibits a bijou aneroid [2816], the dial being only five-eighths of an inch in diameter, and the outside case only $\frac{3}{4}$ of an inch ; it has jewelled bearings, and probably is, as the maker says, "the smallest instrument of the kind ever constructed."

An aneroid [2810] with jewelled bearings and magnifying reading lens, is exhibited by the Hon. Ralph Abercromby.

Casella sends a specimen of Field's engineering aneroid, fig. 12, 2 in. in diameter, and also a diagram showing the marvellous results obtained with it by Mr. W. H. Thomas, C.E. This is the only form of aneroid which has an altitude scale capable of adjustment for air temperature, and therefore of yielding accurate results corrected for the temperature of the air at the time of observation.

Deutschbein, of Hamburg, sends aneroids on the Reitz system [2817 and 2819] and on his own [2818].

Richard, of Paris, sends metallic barometers of extreme sensibility, one [2809b] 7.9 in. in diameter is said to be so delicate that 0.001 in. of pressure is represented by a motion of the hand through nearly half-an-inch—another [2809c] $5\frac{1}{2}$ in. in diameter, is said to give about half-an-inch for 0.010 of pressure.

Redier, of Paris, exhibits a barometer dial *five feet* in diameter, the hand of which is kept in its true position by a single ordinary aneroid vacuum box. This at first appears a paradox, for the mastery of a hand for a five feet dial requires considerable force. The solution of the mystery lies in the fact that the motive force is (as in Redier's barograph) a double train of clockwork, and all that the aneroid has to do is to allow one of these trains to work, or to prevent it so doing—the force for which can hardly exceed half-a-dozen grains.

(To be continued.)

FINE METEOR.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps a short account of a meteor which I observed on Saturday, May 20th, may be of interest.

At 1.42 a.m. I was walking along Oxford-road, Kilburn, facing N., when a sudden light, like a double flash of lightning, only rather more prolonged, lit up the road. On looking up, I saw a most brilliant meteor, or rather two, moving rapidly across the sky, one was following almost close on the other ; the first was about five times as bright as a star of the first magnitude, and had a bluish tinge ; the second was yellow, and not quite so bright. They were accompanied by a brilliant and clearly-defined tail, which did not remain any appreciable time after their disappearance.

The course of the meteors was perfectly straight from S.S.W. to N.N.E., and they disappeared about 60° above the horizon.

The sky was clear, and the night calm and rather cold.

I am, Sir, yours faithfully,

H. SOWERBY WALLIS.

1, Springfield Road, N.W., May 22nd, 1876.

MAY, 1876.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.				Days on which "1 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Differ- ence from average 1860-5	Greatest Fall in 24 hours.			Max.		Min.			
				Dpth	Date.		Deg.	Date.	Deg.	Date.		
											inches	inches.	in.
I.	Camden Town .....	.94	— 1.46	.43	22	6	71.1	30	32.8	5	0	5
II.	Maidstone (Linton Park).....	.99	— 1.25	.44	24	6	78.0	30	30.0	2	7	...
III.	Selborne (The Wakes).....	.63	— 1.85	.49	24	4	66.5	23†	29.5	5	7	8
III.	Hitchen .....	.71	— 1.22	.18	22	10	65.0	21‡	28.0	1	10	...
IV.	Banbury .....	.31	— 1.91	.11	24	6	70.0	30	29.5	2, 3	3	...
IV.	Bury St. Edmunds (Culford).....	.70	— 1.46	.30	26	8	75.0	30	28.0	3	7	10
V.	Norwich (Sprowston) .....	.74	...	.18	22	12	...	...	...	...	...	...
"	Bridport .....	.29	— 1.74	.20	24	3	...	...	...	...	...	...
"	Barnstaple .....	.64	— 1.80	.34	23	5	70.0	7, 21	35.0	1	...	...
"	Bodmin .....	.29	— 2.17	.23	25	4	69.0	21	36.0	3	0	3
VI.	Cirencester .....	.65	— 1.63	.34	23	4	...	...	...	...	...	...
"	Shifnal (Haughton Hall) ...	.74	— 1.52	.30	22	6	68.0	21	30.0	2, 3	4	13
"	Tenbury (Orleton) .....	.67	— 2.21	.36	23	6	70.7	21	28.3	3	7	14
VII.	Leicester (Belmont Villas) ...	.60	...	.20	24	6	71.0	21	29.8	3	1	...
"	Boston .....	.84	— 1.10	.31	22	8	72.0	20	32.0	2, 3	2	...
"	Grimsby (Killingholme)	1.24	...	.45	26	8	67.0	29‡	32.0	3	1	...
"	Mansfield	1.02	...	.52	24	10	70.6	21	25.2	3	6	6
VIII.	Manchester	1.08	— 1.58	.42	23	6	72.0	21	29.5	3	2	9
IX.	York .....	.71	— 1.24	.36	22	7	66.0	28	30.0	2	2	...
"	Skipton (Arncliffe)	1.02	— 2.33	.25	22	10	71.0	21	32.0	19	...	...
X.	North Shields .....	.99	— 1.65	.36	23	10	65.0	5	32.0	3	1	3
"	Borrowdale (Seathwaite).....	2.05	— 7.49	.80	22	7	...	...	...	...	...	...
XI.	Cardiff (Ely) .....	...	...	...	...	...	...	...	...	...	...	...
"	Haverfordwest .....	.33	— 2.39	.12	27	5	64.2	11	30.0	2	3	15
"	Machynlleth .....	.68	...	.21	22	5	74.0	6	27.0	1, 2	7	...
"	Llandudno .....	.26	— 2.12	.11	21	6	...	...	...	...	...	...
XII.	Dumfries (Crichton Asylum).....	.63	— 1.80	.37	23	5	68.0	7	29.5	2	4	5
"	Hawick (Silverbut Hall).....	1.11	...	.41	23	6	...	...	...	...	...	...
XIV.	Kilmarnock (Annanhill).....	...	...	...	...	...	...	...	...	...	...	...
XV.	Castle Toward	1.09	— 2.30	.29	22	7	62.0	6, 11	30.0	3	1	...
XVI.	Mull (Quinish) .....	.66	...	.14	26	7	...	...	...	...	...	...
"	Leven (Nookton).....	...	...	...	...	...	...	...	...	...	...	...
"	Grandtully .....	.63	...	.32	23	3	...	...	...	...	...	...
XVII.	Braemar	1.22	— .58	.70	23	10	65.0	6	28.0	2	9	21
"	Aberdeen .....	.61	...	.13	21*	10	72.7	28	33.1	3	0	7
XVIII.	Loch Broom	2.16	...	.77	23	11	...	...	...	...	...	...
"	Portree	2.06	— 3.59	.51	28	12	...	...	...	...	...	...
"	Inverness (Culloden) .....	.70	— .86	.33	24	11	63.4	9, 13	29.8	2	1	14
XIX.	Helmsdale	1.40	...	.34	24	10	...	...	...	...	...	...
"	Sandwick	1.32	— .94	.35	21	13	58.8	11	34.0	1	0	1
XX.	Caherciveen Darrynane Abbey.....	.83	...	.28	21	7	...	...	...	...	...	...
"	Cork .....	.25	...	...	...	...	...	...	...	...	...	...
"	Waterford .....	.57	— 1.68	.36	22	5	69.0	31	34.0	3	0	...
"	Killaloe	1.36	— 1.82	.53	22	5	75.0	20‡	26.0	3	5	...
XXI.	Portarlinton .....	.44	— 2.76	.21	24	8	66.0	20	30.5	2	2	...
"	Monkstown, Dublin .....	.66	— 1.25	.25	23	5	...	...	...	...	...	...
XXII.	Galway .....	.85	...	.47	23	6	71.0	8	33.0	1	0	...
"	Ballyshannon .....	.97	...	.48	22	6	...	...	...	...	...	...
XXIII.	Waringstown .....	.36	...	.16	23	4	70.0	20	26.5	1	3	11
"	Edenfel (Omagh)	1.16	...	.52	21	8	65.0	6	26.0	1	6	...

* And 24.

† 29.

‡ 30.

+Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON MAY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LINTON.—Very cold, with N. and N.E. winds for the first 19 days, with frost nearly every evening, but the wind changed from N. to S. on 20th, and the latter part of the month milder, but vegetation very late, and as a whole it may be pronounced a disastrous month. Bar. generally high, and very little rain.

SELBORNE.—Prevailing winds first 20 days N.E., without one day's change; remainder of the month S.W. or N.W. The driest May for many years; less rain by 1.60 in. than the average of 12 years. All crops greatly retarded by the drought and cold. Temp. 4 ft. above ground on 20th, 33°-0.

HITCHEN.—A very cold month, average temp. only 46°.

CULFORD.—A dry and very cold May; E. or N.E. winds from the 2nd to the 20th, and an entire absence of rain from the 2nd to the 22nd; it only rained on 8 days, and the amount is only .70 in. The mean temp. of the month was 50°-2; polar winds prevailed on 20 days.

SPROWSTON.—An unusually cold and dry month, .74 in., is about 1½ in. below the average. H and R on evening of the 12th. Slight TS at 4 p.m. on 23rd.

BODMIN.—Average temp. of month 58°-2; rainfall 2.39 in. below the average of 27 years.

SHIFNAL.—Willow wren first heard on 4th; swifts arrived on 6th, and fly-catchers on 30th. An unusually dry, cold May, the driest since 1844, the nearest approach having been 1863, when .79 in. fell, and 1870, when the fall was .76 in. With the exception of .03 in. which fell on the 1st, there was not a drop of R till the 22nd, when a change of wind from N. and N.E. to S.W., brought a refreshing fall of .30 in., followed on 24th by .29 in.; this, however, was soon dried up again by a return of the wind to the N. and N.W., in which quarter it remained till the close of the month. Bar. remarkably high throughout; scarcely any high winds; frost on the ground on 13 nights, kept vegetation very backward.

ORLETON.—A very cold and dry month, with a steady N.E. wind, and frequent frosty mornings. No measurable R fell between the 3rd and 21st; the weather was generally bright and favourable for farming operations. After the 20th R fell each day till the 25th; the remainder of the month was dry and fine, with much sun. Distant T was heard on 24th. Mean temp. of month was 3° below the average, and lower than that of any May for the last 16 years, except that of May, 1869.

LEICESTER.—Very dry month; no R falling between 2nd and 22nd; cold E. winds during the first 20 days; nights remarkably cold; the temp. on grass being frequently below the freezing point; the mean temp. for that period was only 46.8 in. T on 24th; H on 25th. Vegetation very backward.

BOSTON.—Temp. 3°-2 below the average. A bitterly cold E. wind blew without intermission from the 7th to the 20th, checking the growth of the grass and young wheat, and making vegetation very backward. May in flower about the 22nd.

GRIMSBY.—Month very dry and ungenial till the 22nd, when we had some welcome rains, followed by fine growing weather. I never heard so little song from the white throat, willow wren, and other warblers. The foliage of both ash and oak very backward, but the ash further behind the oak than usual, owing no doubt to the dry weather. Willow warbler arrived on 3rd; spotted fly catcher first seen on 10th. Apple in blossom on 4th. Distant T on 22nd, and TS at 4.30 p.m. on 23rd.

MANSFIELD.—The month opened dull and bleak, changing on the 3rd to very agreeable weather, but on the wind veering to E. on 7th, a succession of dry cold days followed, parching up vegetation, and playing sad havoc among the young fruit; the 14th showed signs of a change, but the wind soon got into its old quarter, and the dry bright days continued till the 20th, when the wind got to the S.W., and as the air was charged with electricity, a few days of un-

settled weather followed ; the month, however, ending in fine genial seasonable weather. First swallow seen on 4th. T and L on 22nd. R, H, T and L at 3.15 p.m. on 24th.

ARNCLIFFE.—The smallest record of R I have ever made in May.

WALES.

HAVERFORDWEST.—One of the coldest and most ungenial May months on my record of 26 years ; on 18 nights the temp. below 40° ; scarcely any R or dew ; air extremely dry and harsh ; vegetation consequently suffering considerably. Easterly and northerly winds prevailed throughout the month. Driest May since 1859, when no R fell. Sky generally clear and bright throughout the month.

MACHYNLLETH.—A very cold month ; wind in the E. or N.E. to the 20th, then changed to the W., and a little warmer. Ther. fell very nearly to the freezing point on many nights ; this has been the driest month we have had since I began observing in 1869. T about 3 p.m. on 24th ; T and L about 10 p.m. on 30th.

LLANDUDNO.—A very dry month ; no R up to the 20th, and from then only .24 in. Polar winds prevailed up to the 19th, but their keenness tempered by ample sunshine ; only one night's frost. Grass suffering much from the drought. Broom in bloom on 2nd ; lilac on 5th ; hawthorn on 8th ; laburnum on 12th ; honeysuckle on 16th ; mountain ash on 24th.

SCOTLAND.

DUMFRIES.—A very cold month ; rainfall unprecedentedly small, and temp. 3° below that of last year. Winds chiefly E. from 6th to 20th.

HAWICK.—The first 8 days sunshiny, but keen frosty nights ; 9th and 10th were very damaging to all kinds of crops from the strong arid E. winds. Very keen frosts on the nights of 11th and 12th. Ther. registering 6° (?) on both nights. Fine genial R on 22nd, followed by heavy T showers on 23rd. The month has not been favourable for the growth of anything, and everything is late this season. A fine appearance of blossom of apples and pears, which coming late, escaped the frost.

CASTLE TOWARD.—No R measureable till the 22nd, and the total fall of the month (1.09 in.) very much below the average. It has been a favourable month for all kinds of out-door work, and seeds being got into the ground in good order. Pastures look well since the R, of which they were previously in great need ; the strong E. winds have parched everything.

BRAEMAR.—First half of the month very dry ; vegetation in consequence fully three weeks later than usual.

ABERDEEN.—A very dry month ; R scarce one-third of the average ; bar. much above the average, and the temp. about $1\frac{1}{2}^{\circ}$ above the average ; winds light, but too often from N., N.W. and N.E. ; crops very far behind.

LOCHBROOM.—This has been a remarkably dry month, at times quite hot, at others cold ; with the exception of a slight shower on 15th, we had no R till the 20th, after which copious rains fell on three or four days, and more or less on every day till the 30th, except on the 27th. The farmers grumbled, but the fine weather was very favourable for the lambing season, though the feed for the stock generally was reduced thereby.

PORTREE.—The first 18 days of the month were quite rainless, with cold, sharp easterly winds and frosts at night ; after the 18th R every day (except the 24th), and the weather still cold. Total fall, 2.06 in., is exactly the same as that of 1871.

CULLODEN.—A storm of H in forenoon of the 1st, and a slight shower on the 15th, but no other fall till the 22nd ; total fall about half the average. E. winds very prevalent ; corn crops and pasture suffering for want of moisture.

SANDWICK.—May has been a pleasant month ; till the 21st it was very dry, and the soil became parched, but after that time there was moisture in some form almost every day to moisten the soil and refresh the vegetation.

IRELAND.

DARRYNANE.—An unusually dry month, total '83 in. I never registered less than 1'20 in. in any month before, and that was May, 1874. In the early part rather sharp E. winds, the latter part much milder, with variable winds. A gale from N.W. on 22nd and 23rd; H with T on 24th; no R till the 20th, after which to 25th R daily. Potato crop looking well, but great complaints of a scarcity of grass for want of R. Sea very calm all the month.

KILLALOE.—A very late month; much blight from the frost in the first five nights; no R till the 22nd. Flowering plants whether in garden or field fully three weeks late. The hardy blackthorn more than a month late.

MONKSTOWN.—The first three weeks unusually dry and bright, with cold E. winds; R on 21st, 22nd, and 23rd. The latter part of the month bright and warm.

BALLYSHANNON.—The month has been unusually dry ('97 in.), but little more than half the quantity that fell in the corresponding period of 1875. No R till the 21st, except '01 in. on the 15th. Grass has suffered severely in consequence, and crops in general are backward; hawthorn only now coming into bloom. Salmon fishing, owing to drought, is not so good as in former years.

WARINGSTOWN.—Very dry; no R till 21st, and only '36 in. in the month.

EDENFEL, OMAGH.—Weather up to 20th dry and parching, with strong sun by day, and cold, sometimes frosty, nights (no R to 21st, except '01 on 14th); remainder of the month broken, rainy, and deficient in warmth. Vegetation still backward.

SUPPLEMENTARY TABLE OF RAINFALL IN MAY, 1876.

[For the Counties, Divisions, Latitudes, and Longitudes of these Stations, see Met. Mag., Vol. XI., p. 28.]

Station.	Total Rain. in.	Station.	Total Rain. in.
Acol	1'23	Llanfrechfa	'42
Hailsham	'90	Castle Malgwyn	'29
Andover	'23	Heyope	2'8
Strathfield Turgiss	'29	Rhug, Corwen	'88
Addington Manor	'63	Port Madoc	'68
Oxford	'75	Melrose	'96
Cambridge	'46	Cessnock, Glasgow	'81
Sheering	'76	Gruinart	'97
Ipswich	'92	Keith	1'34
Diss	'77	Strathconan	1'78
Swaffham	1'24	Springfield, Tain	'77
Compton Bassett	'61	Skibbereen	2'7
Dartmoor	'45	Glenville, Fermoy	'39
Teignmouth	'65	Tralee	1'11
Torrington (Langtree) ..	'20	Newcastle W., Limerick ..	1'14
Trevarrick, St. Austell ..	'24	Kilkenny	'61
Taunton	'18	Kilsallaghan	1'50
Sansaw	'57	Twyford, Athlone	'58
Cheadle	1'41	Ballinasloe	'67
Ashby-de-la-Zouch	'70	Kylemore	2'10
Coston, Melton Mowbray ..	'72	Bangor	2'11
Bucknall	'78	Carrick on Shannon	'61
Walton, Liverpool	'56	Rockcorry	'59
Broughton-in-Furness ..	'51	Warrenpoint	'42
Stanley, Wakefield	'68	Bushmills	'57
Gainford	69'2	Buncrana	'69
Shap	'86		