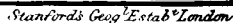


Injured Trees be marked thus:

Five times Scale of Plan
Wall 5 4'-2 0 feet



SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

XCV.]

DECEMBER, 1873.

[PRICE FOURPENCE.
[or 5s. per ann. post free.]]

LONG CONTINUED HIGH BAROMETRIC PRESSURE.

Writing, as we do, on the 12th consecutive day of a pressure exceeding 30·40 at sea level, and with it still steady at 30·60, it is not for us to say how much longer it will continue; but as it is already a period of unparalleled duration during the past 14 years, we believe it will interest many of our readers to compare it with previous periods in which the pressure has exceeded 30·50 at sea level. In the following table we therefore give *all* the instances of pressure exceeding 30·50 (and occasionally a few lower ones) from 1860 to the present time, as extracted from the Camden Town Observations. The extreme height reached this year has not yet been remarkable; but the persistency of high pressure is without parallel since 1860, if not for a still longer period. The absolute extremes are denoted by *, and where they were observed at other than the regular hours, they are given at the end of each year.

	1860	9 a.m.	9 p.m.
February 13.....	30·595	...	30·614
14.....	·624*	...	·600
15... ..	·554	...	·350
March 6.....	·575*	...	·283
November 7.....	30·532*	...	30·492

	1861		
January 21.....	30·507*	...	30·489
February 2	·676	...	·689
3.....	·528	...	·314
April 9	·565	...	·592*
10.....	·577	...	·504
11.....	·503	...	·469
Novembr 18.....	·353	...	·582
19.....	·604*	...	·441
Decembr 27.....	·595*	...	·567
28.....	·559	...	·540
29.....	30·514*	...	30·492

February 2, 30·729 at 0.30 p.m.
December, from 19th, to January 2nd,
never below 30·262

	1862		
February 8.....	30·605	...	30·689
9.....	·630	...	·631
10	30·566	...	30·465
February 8, 30·690	at 8.30 p.m.		

	1863	9 a.m.	9 p.m.
January 27.....	30·199	...	30·510
28.....	·569	...	·260
February 12.....	·347	...	·524
13.....	·681	...	·693*
14.....	·677	...	·592
15.....	·633	...	·629
16.....	·663	...	·681
17.....	·655	...	·589
18.....	·537	...	·464
March 24	·509	...	·526
25.....	·558*	...	·431
November 6.....	·512	...	·447
Decembr 18.....	·492	...	·605*
19.....	30·502	...	30·478

January 28, *30·587 at 10 a.m.

February, from 12th to 26th, only
once below 30·340, and never below
30·000 from the night of the 2nd to
the end of the month.

	1864		
January 2... ..	30·516	...	30·608
3.....	·657*	...	·656
4.....	·609	...	·485
29.....	·402	...	·513
30.....	·532*	...	·438
November 6.....	·606	...	·690
7.....	·543	...	·304
December 24.....	·538	...	·595*

1865			
February	10.....	30·595 ...	30·544
	11.....	·597* ...	·514
June	7.....	·397 ...	·582*
	8.....	·536 ...	·484
Novembr	12.....	·442 ...	·504*
December	8.....	·580 ...	·586
	9.....	·556 ...	·572
	10.....	·627 ...	·658
	11.....	·721 ...	·720
	12.....	·688 ...	·594
	13.....	·545 ...	·523
	14.....	·516 ...	·477
	15.....	·713 ..	·782*
	16.....	·711 ...	·687
	17.....	·687 ...	·619
	18.....	30·544 ...	30·444
June, never below	30·220 from 4th to		
23rd. Mean of the month,	30·221.		

1866			
January	23.....	30·128 ...	30·572
	24.....	·578 ...	·649
	25.....	·663* ...	·642
	26.....	·640 ...	·496
October	7.....	·505* ...	·459
December	8.....	·264 ...	·512*
	20.....	30·530* ..	30·457

1867			
February	3.....	30·526* ...	30·273*
	20.....	·499 ...	·554
	21.....	·589* ...	·515
	22.....	·486 ...	·419
	23.....	·509 ...	·488
March	1.....	·555 ...	·672
	2.....	·788* ...	·782
	3.....	·695 ...	·588
	4.....	·504 ...	·379
June	26.....	·561 ...	·571
	27.....	·600* ...	·590
	28.....	·572 ...	·579
Septembr	25.....	·505* ...	·497
Novembr	2.....	·359 ...	·565
	3.....	·581* ...	·480
	6.....	·475 ...	·532
	7.....	·631 ...	·621
	8.....	·626 ...	·630
	9.....	·651* ..	·606
	10.....	·565 ...	·472
	21.....	·521 ...	·591
	22.....	·549 ...	·500
	23.....	·519 ..	·572
	24.....	·681* ...	·642
	25.....	30·546 ...	30·449

1868			
February	9.....	30·546 ...	30·574*
	10.....	·558 ...	·527
	11.....	·503 ...	·558
	12.....	30·548 ...	30·424

February	16.....	30·577* ...	30·495
March	28.....	·466 ...	·605
	29.....	·623* ...	·554
	30.....	·537 ...	·486
Novembr	12.....	·430 ...	·591
	.....	30·653* ...	30·423

1869			
January	9.....	30·547* ...	30·498
	19.....	·522* ...	·507
October	22.....	·503* ...	·468
Novembr	18.....	·552* ...	·501
December	5.....	·470 ...	·586
	6.....	30·589* ...	30·412

1870			
January	17.....	30·521 ...	30·579
	18.....	·608* ...	·577
	19.....	·545 ...	·497
April	4.....	·531* ..	·459
	16.....	·506* ...	·451
June	5.....	·399 ...	·566
	6.....	·541 ...	·471
Septembr	16.....	·532* ...	·521
October	1.....	·538 ...	·551*
	2.....	·526 ...	·505
Novembr	2.....	·530* ...	·517
	3.....	·508 ...	·478
	30.....	·472 ...	·534*
Deeembr	1.....	·579 ...	·628*
	2.....	30·604 ...	30·494

1871.			
October	12.....	30·400 ...	30·505*
Decembr	8.....	·508* ...	·446
	12.....	30·520* ...	30·473

1873			
February	15.....	30·423 ...	30·548
	16.....	·632 ...	·646
	17.....	·680 ...	·750
	18.....	·790 ...	·757
	19.....	·726 ...	·641
	20.....	·600 ...	·530
Septembr	22.....	·531* ...	·512
October	21.....	·514* ...	·390
December	1.....	·532 ...	·532
	2.....	·513 ...	·577
	3.....	·610 ...	·614
	4.....	·634 ...	·550
	5.....	·469 ...	·416
	6.....	·415 ...	·560
	7.....	·560 ...	·566
	8.....	·615 ...	·604
	9.....	·603 ...	·533
	10.....	·562 ...	·606
	11.....	·642 ...	30·623
	12.....	30·651 ...	

February 18th, 30·812* at 1 p.m.

THE ORTHOGRAPHY OF THE WORD EQUATORIAL.

To the Editor of the Meteorological Magazine.

SIR,—This matter seems to settle itself. There is not, I believe, a single instance in the English language of a word similarly formed, ending in *eal*.

We have *armorial*, *editorial*, *manorial*, and a hundred others after the same model; indeed, while *ial* is a common termination for adjectives, *eal* is very uncommon; it is used in the case of a few words derived directly from the Greek, such as *empyrean*, *ethereal*.

Perhaps those who write *equatoreal* will tell us the reason why.

R. B.

December 6, 1873.

THE NEWBOTTLE WHIRLWIND OF NOV. 30TH, 1872.

BY T. BEESLEY, F.C.S.

(Continued from page 154).

The wall is continued along the east side of the next field as far as a ford across a small brook which flows through the ponds at Astrop; but there are no trees along its course here. This wall was broken down in six places—in one place near the ford, for the space of 200 feet—all the stones lying to the west, and affording evidence that the direction of the vortical motion was opposite to that of the sun's course, or the hands of a watch. A short cross wall from the end of this wall to the ford was also broken down. About here the greatest fury of the whirlwind seems to have been spent. The brook runs from north-east to the ford; and every tree along it for 450 yards, is thrown down, broken off, or greatly damaged. The first, a large ash, close to the ford, had its head broken off and lying N.N.W.; a second ash was broken off twelve feet from the ground. Just beyond this, a large elm was thrown across the brook to W.; then three more were topped, and finally, another elm was thrown across the brook to W. Three small trees were injured a little S.W. of the ford; as also a small elm in a hedge at the end of the long wall. From this scene of destruction a stream of branches stretching in a northerly direction across the next field, in some places cutting furrows in the soft turf, points out the course of the whirlwind; but it seems to have rapidly lost its force here, and to have ceased to be a visible object. It may, however, still be traced by slightly damaged trees to the top of the hill east of Rosamond's Bower, where two ricks, which had their thatch partly removed, mark the limits of its path. Between these some trees were slightly broken, and the same damage may be seen for three fields beyond. Just where the road from Farthinghoe Lodge turns northward to Purston, is a cow-shed of rough boards with a thatched roof. Three men had taken shelter here at the time of the storm, and, as the wind came along, the roof was so shaken, that they ran out in a fright. Two miles beyond, at Thenford, a rustic bridge was noticed by a person passing over it to be much shaken, and trees near the pond at Marston St. Lawrence were violently agitated, but no mischief was done.

Landspouts, like waterspouts, seldom come alone. Whilst the three men threshing beyond Newbottle were looking with astonishment at the phenomenon just described, they saw the water of a pool near Mr. F. Dagley's farmhouse, three quarters of a mile east of Newbottle (near "Bunting House" of the Ordnance Map), rise in spray above the tops of the trees, and this, the pool itself being hidden by higher ground, they could not have done unless it had risen at least 60 feet. The water fell again a little further north. Three little boys (William Boyles, John Markham, and George Payne) had just taken dinner to the men, who, seeing that a storm was coming on, had sent them back to Charlton as quickly as possible. Just as they passed the pool, the water rose up into the air. Of course they ran away as fast as they could; but in a little while curiosity got the better of fear;—they looked back and saw the water falling again like rain. They thought the pool was half emptied, but the brook runs through it, so that it soon filled again. Mrs. Mitchell, living in a cottage near the school at Charlton, noticed both whirlwinds:—one going towards Newbottle Spinney; the other after violently agitating the trees near her house, taking the direction of Mr. Dagley's farm, where after drinking at the pool, it seems to have vanished.

It will be seen by reference to the accompanying plan, or to the Ordnance map of the district (No. 45, quarter sheets N.W. and N.E.), that the course of the whirlwind was generally N.N.E., but with a slight curve—more easterly in the early part of its course, afterwards more nearly approaching a northerly direction. The width of the path when first noticed seems to have been about 200 yards; at Rosamond's Bower it must have been double this, but its greatest force was evidently confined within narrower limits, perhaps corresponding to the eastern half of the circle, where the rotary motion conspired with that of progression. Any estimate of the velocity of the former must be very uncertain: the velocity of progression, according to the statements of several observers, that a man running down hill could hardly keep up with it, and from their rough guesses of the time during which they watched it, was probably about a mile in five minutes. It should be mentioned that most of the persons who saw it, with whom I conversed, were intelligent men of their class; and one or two, as the elder Adkins, particularly so.

Every one has seen at corners of streets in gusty weather the little revolving clouds of dust produced by eddying winds; and many have seen in the fields at hay or harvest time the hay or straw, or sometimes even sheaves of corn, whirled in circles high up into the air. These are phenomena of the same kind, but on a smaller scale, as that just described. Occasionally, too, may be seen in the distant horizon funnel-shaped clouds stretching their long pipes to the earth—true "windspouts" made visible by the condensation of vapour, but perhaps hardly dense enough to attract attention from observers nearer to them. Whirlwinds causing much damage are not uncommon—many are recorded in old books on local natural history; but it is believed that

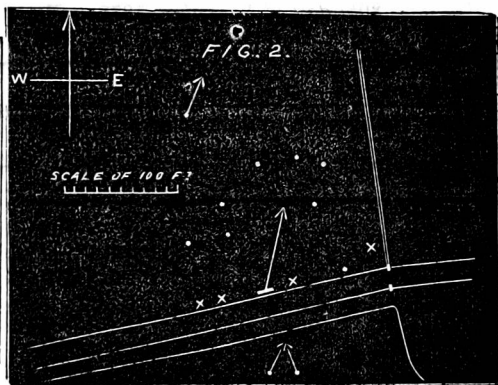
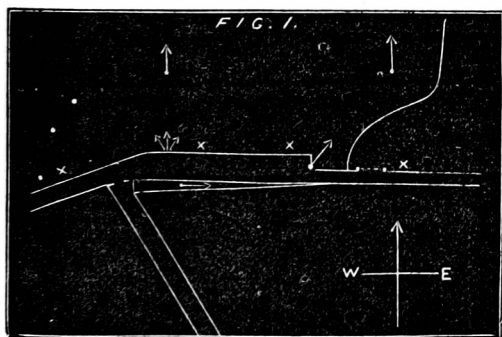
there is no recorded case of one in England, at once so striking in appearance, and so accurately observed, as the subject of the present narrative.

I wish to add, that I am indebted to Mr. Symons for many of the measurements of angles and other observations made during two hard days' work upon the spot together. T.B.

We believe that the previous narrative, in which Mr. Beesley has incorporated the statements of no less than twenty-eight persons, who from sixteen different spots witnessed the progress of this whirlwind, is unique in its authenticity, detail, and conciseness. We promised in our last to add a short postscript to Mr. Beesley's narrative, but its completeness removes the necessity.

The lithograph map is, we think, self-explanatory, except, perhaps, the terms "Pho. IV.," and "W^t I.," the former indicating the position of the camera when photograph Fig. IV. was taken, and the latter referring to the enlarged woodcut plan Fig. I.; damaged trees are marked with a \times , both in the woodcuts and in the lithograph; and in the former, sound trees are occasionally marked by circles, to show the narrowness of the path, or the capriciousness with which trees in the full track of the whirlwind were often spared. This is well seen in photograph No. 1,* which shows the huge beech lying prostrate, and yet, close to its head, several smaller trees absolutely untouched.

The remark by more than one of the men that the "rope," "pipe," or "trunk," which was "shot down to the earth," varied in length, only reaching the ground at intervals, may probably account for this remarkable immunity.



Considerable interest attaches to the weather existent on the day of this whirlwind. The daily weather map for the morning of that day shows a very low sea level pressure (28.4 in.) in the south-west of Ireland, and strong S. wind on its south-east coast. In the neighbourhood of Banbury low pressure (29.0 in.), and light S.W. wind. The fol-

* Six photographs of the effects were taken at points marked on the plan. The negatives are in the hands of Mr. Herbert, photographer, Horse Fair, Banbury, who will supply copies, post free, at 1s. each, or unmounted at 9d.

lowing are the notes of some of our correspondents, arranged in Divisions in the usual order:—

II. CROWBORO' BEACON OBSERVATORY, Nov. 30, 1872.—Densely overcast and damp morning; more rain last night; rather finer during the forenoon, but heavy rain appeared to be falling both to the E. and W. of us. About 3 p.m. a very heavy shower of R and H with L, and the wind rising again from S.S.E.; bar. has been falling all day, and is now lower than it has been at any time during the month. 9 a.m. 29·137 at sea level. 9 p.m. 28·950.

II. HYTHE. 5.15 p.m., L.—SELBORNE. T & L at 1 p.m.

III. HITCHEN. Heavy T shower.—MAGDALEN COLLEGE, OXFORD. H, R and T.—ADDINGTON, WINSLOW. Five or more peals of T.—THE LODGE, SANDY. Heavy shower and T.

V. BEAMINSTER, DORSET. T at 5 p.m.—TAVISTOCK, KILWORTHY HILL. Cloudy, T L, R and H.—DRUID, ASHBURTON. 7 a.m. T and L, min bar.—COURT BARN, CLAWTON. T.—POUGHILL VICARAGE,—29th L, 30th bar. lowest for several years, not followed by any storm.

VI. SANSAW HALL. Unaccountable depression in the bar., followed by no variation in weather from 28th to 2nd Dec.—ORLETON. Heavy R in night, showery, L seen at, and distant T heard before 8 a.m.; showery till noon, then fine with clouds and great wind; bar. low, 28·48 at 9 p.m.

VII. BOSTON. Stormy all day, with heavy showers.—GRIMSBY. Very low bar.

IX. LOCKWOOD BECK.—A fine morning, showery afternoon.

XX. FERMOY. Fair.—BRUCE VILLA, CLONMEL. Storm, aneroid 28·35.

We have also been favoured with the following extract, but except in the shift of the direction of the wind, and in the record of the hail showers, no indication is apparently afforded by these observations. We have added the equivalent sea level pressure to facilitate comparison.

Photo-Meteorological Observations recorded at the Radcliffe Observatory, Oxford, on 30th day of November, 1872. Extracted (at the request of Mr. Symons) from the two-hourly Register.

Date.	Barograph reduced to 32°	Thermograph.	Anemograph Direction of wind.	Anemograph 2 hours velocity of wind.	Sea Level Pressure.
	inches.	deg.		miles.	inches.
Nov. 30th, 2 a.m. ...	28·852	47·0	W. b. S.	31·2	29·076
„ 4 „ ...	28·852	44·5	S.W.	26·4	29·077
„ 6 „ ...	28·824	42·8	S.W.	16·8	29·049
„ 8 „ ...	28·796	44·5	S.S.W.	24·0	29·020
„ 10 „ ...	28·782	46·5	S.S.W.	27·6	29·006
„ noon	28·739	49·0	S.W.	27·6	28·961
„ 2 p.m.	28·696	44·8	S.S.W.†	20·4	28·920
„ 4 „ ...	28·640	44·8	S.S.W.	28·8	28·864
„ 6 „ ...	28·611	46·5	S. b. W.	25·2	28·835
„ 8 „ ...	28·583	48·2	S.S.W.	34·8	28·806
„ 10 „ ...	28·569	47·6	S.S.W.	36·0	28·792
„ midnight..	28·583	47·0	S.W.	39·6	28·806

† At 1 p.m. W. b. S.

Rain fell on Nov. 29th, from 6 p.m. to 10 p.m., to the amount of 0·13 in.; nad from noon to midnight on Nov. 30th, to the amount of 0·41 in. Hail fell Nov. 30th, at 0.20 (noon), and at 1.20 p.m. In the first instance, the temperature fell about 1°·5, and in the second about 3°·5.

ROBERT MAIN.

From these the general character of the weather may easily be gathered—but still more interesting is the following note, for which we are indebted to Mr. R. H. Scott, F.R.S.

“At Yarmouth, in the evening of November 30th, the velocity suddenly rose from 20 to 52 miles an hour, without any serious change of direction, and as suddenly fell again. The velocity of 52 miles was registered between 10.30 and 11.30 p.m. from S.E. by S, but it was almost entirely due to a violent squall at 11.5, which must have far exceeded that velocity as long as it lasted.”

Mr. Beesley truly remarks that “Landspouts, like waterspouts, seldom come alone;” and though, of course, we do not suggest any *direct* connection between the Newbottle whirlwind and the Yarmouth squall, it is strongly confirmatory of the theory that there are often several small squalls of great intensity, travelling along with the greater atmospheric movements—eddy, in fact, in those cyclonic systems which often simultaneously affect many thousand square miles.

Lastly, there are several lessons in this narrative. We do not hesitate to quote it as a specimen of how such phenomena should be investigated and recorded, that Mr. Beesley, in spite of a host of difficulties (*e.g.*, plan drawing in ploughed fields in wet December weather), has left a pattern which we trust will be implicitly followed by those of his brother-observers who may have the good fortune to have opportunities of recording similar facts.

The thanks of meteorologists are also due to T. L. M. Cartwright, Esq., and Sir W. R. Brown, Bart., for their thoughtfulness in ordering that not a stone should be replaced, nor a tree moved, until all necessary measurements and photographs were taken.

[We regret that owing to circumstances beyond editorial control, it was impossible to send proof of the first portion of this article to the author, and that the printing was not up to our usual standard. The only misprints which affect the sense are (1) page 151, line 7, after “elevation” insert “and”; (2) on the same page the quotation from Lucretius should have been marked as a foot note to the word “cloud” in the 36th line; (3) on page 152, line 36, omit the first word, and the next line should begin “one at.”]

THE BRITISH ASSOCIATION AT BRADFORD.

(Concluded from page 158.)

G. M. WHIPPLE ON A NEW SELF-RECORDING ELECTRICAL ANEMOGRAPH.

Among the many instruments which have been devised for recording continuously and automatically the velocity and direction of the wind, none appears to have met with more general approval than the form known as the Beckley or Kew Pattern Anemograph.

This instrument was originally constructed in 1857 by a grant from the British Association, and a detailed description with plates is to be found in the published report of the 1858 meeting.

Some minor modifications found desirable having been introduced in the instrument it was accepted by the Meteorological Committee for employment in their observatories, and the improved anemograph is fully described in the report of the committee for 1867.

The essential features of the instrument may be thus described.

It consists primarily of two parts. First, a velocity recorder and secondly a direction recorder.

1st. *Velocity recorder*.—A system of Robinson's cups puts a vertical shaft in motion, the movement of this being suitably reduced by wheelwork, is transmitted eventually through shafting to a spiral pencil, which in rotating marks upon suitably prepared paper wrapped round a drum, revolving continuously at a uniform rate.

Lines drawn upon the paper serve to indicate the velocity of the wind passing over the instrument at any given instant.

2nd. *Direction recorder*.—A windmill vane mounted immediately below the Robinson's cups, like them gives motion to a vertical shaft, which is directly connected to a spiral pencil similar to that recording the velocity, and fixed beside it. The gearing is so arranged that this pencil makes a complete rotation, marking from one extremity of the scale to the other, for every revolution of the vane, indicating thereby the veering of the wind from north round to north again.

Experience has shown that under most conditions the working of this instrument leaves but little to be desired, but that in situations where it is necessary to place the recording apparatus at a considerable distance from the external or driving part of the instrument, its action is subject to irregularities, due principally to the shafting necessarily employed under such conditions. And it is to meet such cases that the instrument now suggested has been devised.

There is no novelty involved in the adaptation of electricity to the purpose of wind registration. Numerous arrangements by which it may be accomplished have been made, amongst others Secchi's, Crossley's, Gordon's, and Hall's are familiar to most meteorologists.

In the new instrument, for the velocity recording, where rotation in one direction only is required, a simple contact key is fixed to the shaft on which the Robinson's cups are mounted. This transmits a short current every time the cups complete a revolution, through a wire which is led to the recording apparatus, intermediate shafting being abolished.

The successive currents then, by means of an arrangement resembling that which obtains in step by step telegraph instruments, produce continuous rotation of a wheel which being in connection with the train at present existent eventually drive the pencil round, and record the wind's movement upon the paper.

Direction. The registration of the direction of the wind by means of electricity is rendered a problem more difficult of execution than the velocity, by reason of the fact that rotation of the wind vane occurs sometimes in the one direction, from north through east to south and sometimes in the opposite, from north through west to south.

Numerous plans have been devised for accomplishing the desired registration, requiring wires varying in number from four to sixteen. In the instrument now described but two are requisite, one of which is employed to transmit the rotary movement of the vane to the recording pencil, whilst the other determines the direction in which the rotation is to take place.

A toothed wheel in electrical communication with a battery is fixed upon the vane spindle and so arranged that a current is passed to the recording apparatus every time a tooth touches the contact piece.

Every current transmitted causes a wheel in the registering apparatus to turn through a certain small arc, always, of course, in the same direction.

In order to record backing of the wind the second wire is made use of.

Above the contact making wheel on the vane shaft an insulated metallic collar is fitted, turning loose on the shaft, from which a small stud projects which plays between two stops on the collar. One of these stops is a conductor whilst the other is insulated. The play of the stud between the two stops is only sufficient to make and break the electric current.

The wire leading from the stop is conducted to an electro-magnet fixed above the recording apparatus, and the effect of the passage of a current through the wire is to cause the armature of the magnet to move through the agency of a crank a slide upon which two mitre wheels are fixed (as in the ordinary reversing clutch) these being brought into gear either on the one side or the other of the

mitre wheel driving the pencil, cause it to rotate in a direct or retrograde direction.

Under ordinary circumstances the upper mitre wheel will be kept in gear with the pencil shaft by the action of a spring, and the vane stud will remain in contact with the insulator, but when the wind "backs" the stud comes in contact with the metallic stop and permits the electric current to pass. The electromagnet then comes into action and lifts the sliding axis, thereby bringing the lower mitre wheel into gear with the pencil shaft. This being the case the rotation of the wheel by the other electric current still goes on tooth for tooth as the vane turns, but the lower wheel being the driver as long as rotation continues in the retrograde direction so long the pencil will turn that way, and the paper on the cylinder will record a "backing" of the wind.

Probably the electrical machinery may require the assistance of a spring or weight to assist in overcoming the friction of the pencil against the paper, but no difficulty need arise in applying such, the shaft always turning one way.

The battery power requisite to work the electrical anemograph will not be large, but no instrument having yet been constructed, it cannot be stated.

A LOCAL THUNDERSTORM.

To the Editor of the Meteorological Magazine.

SIR,—A few notes of the thunderstorm which passed over this village yesterday afternoon, October 24th, may be of interest, as though extremely local it was one of exceptional intensity, and by far the severest we have experienced here in the present year. There had been gradually increasing electric disturbance for some days, and on every night of the week, except Sunday, lightning-reflections had been seen in the large tabular masses of frozen nimbus which lay around the horizon.

The morning was nearly clear, and the atmosphere calm. Thermometer exposed in shade 31°, on grass 29°; barometer at 9 a.m. 29.23 (corr. and red.) Cirrus and composite cloud-bank lay round the W. horizon, with intermingled thunder-clouds; and this gradually worked over, the sky continuing clear in N.E. At 11 a.m. there was very distant thunder in W.N.W., and at 11.30 louder thunder in S.S.W. Then fell a sharp shower, but the sky shortly cleared again in the W. Throughout the afternoon a splendid range of distant thunderstorm extended from N.N.E. to E.N.E. About 3.30 a distant shower appeared in S.W., its summit soon running out in long lines of cirrus nearly to the zenith. A little before 4 there was one distant thunderclap in S.S.W., from which quarter the clouds were slowly rising. Just before sunset the storm began to form rapidly in S.W., about five miles off, the base of the cloud becoming continually lower until it seemed nearly to touch the earth. At 4.50 the discharges suddenly beame frequent over Breinton Common, in the immediate W.N.W. I was standing on high ground in a field, from which the storm could be watched to great advantage. The lightning was now most intensely white and brilliant, especially where the flashes struck the earth's surface. A flash, the time-interval of which was three seconds, was immediately followed by an excessively vivid one, which fell in an orchard opposite me, time-interval about one second. This flash injured, but not seriously, as I am informed, a girl who was

gathering apples under the trees. The next flash was still closer, and accompanied by a tremendous report. The claps were all excessively sharp and short, bearing more resemblance to the sound which might be produced by the instantaneous smashing of a large quantity of glass than to anything else. Large hailstones continued to fall during the storm, which ceased suddenly at 5.30, the sky becoming cloudless in S.W. and W. The total diameter of the storm at its greatest intensity was only $3\frac{1}{2}$ miles. The nimbus seemed to become dissipated shortly after it had passed over to N.E.

The cirrus current was from S.W. in the morning and rather slow, though more rapid than the lower currents. Clouds of less altitude travelled all day slowly from S. by W. and S.S.W. There was a constant dead calm on the earth's surface, except in the storm, when a N. breeze prevailed.

About dusk the distant thunderstorm (a totally distinct one), which had hung for hours in the N.E., was illuminated by occasional lightning, and there was also vivid lightning until 8 p.m., at intervals of four and five minutes, in a nimbus in the far N.N.W. Later in the evening I noticed lightning-reflections in W.N.W., and one or two in S.S.E.—Yours truly,

W. CLEMENT LEY.

Breinton, Hereford, Oct. 15, 1873.

P.S. October 26. The frost this morning was of rather unusual severity. Temp. min. 23° , on grass 19° .

THE OCTOBER FROST.

To the Editor of the Meteorological Magazine.

SIR,—I know not what Mr. Brumham may have in store for us, but the continued low temperature of the last eight days of October in this locality are, I think, almost without precedent—at any rate, of late years. Perhaps the following figures may be found of interest for comparison with those recorded elsewhere. Thermometers placed on the bole of a tree in the open field, and protected from the sun, rain-fall radiation, and 5 feet above ground:—

Date.	Min.	Max.	Mean of day.	Rainfall.
Oct. 24.....	30	53	41.5	0.00
25.....	28	51	39.5	„
26.....	30	52	41.0	„
27.....	29	51	40.0	„
28.....	25	51	38.0	„
29.....	24	48	36.0	„
30.....	26	45	35.5	„
31.....	30	50	40.0	„

Very thick fog till 1 p.m. on 30th.—I am, Sir, yours truly,
WILLIAM CARTER.

Bucknall, Horncastle.

BALLOONS AND UPPER CURRENTS.

To the Editor of the Meteorological Magazine.

SIR,—A San Francisco (Cal.) paper I have just received gives an account of a balloon ascent made from that city on the 18th of October. The heads of this may be of interest in connection with the above.

For one mile the balloon rose swiftly upwards, in an almost *straight line*. It then drifted slowly *to the westward*. It next struck an easterly current and passed over the city in a *north-easterly direction*. From this it struck a *westerly current*; but, suddenly, as the balloon rose, the wind of the upper air changed, and it was driven rapidly *towards the east*. At one and a-half miles high, the course was still *steady towards the east*, and “the great theory of an eastern current seemed about to be established.” Within two minutes, however, the balloon began to verge *towards the westward*. As this meant the open sea, descent was attempted, but missed; and a higher level tried for a change of current. At three miles up the balloon struck a current blowing direct *towards the east*. With this they hoped to carry over the land; but suddenly, the balloon commenced falling with frightful rapidity, and finally plunged into the Pacific, whence the aeronauts were rescued by some boatmen, after severe exertions.

From this it will be seen that such diversities of currents are peculiar to other lands than ours. At Quebec, on the 21st, there were two distinctly opposing currents—(S.W. over N.E.)—with gale and showers of rain. In London, on the 18th, my own records give W. and N.W. winds 19th, N.; 20th, S.W. and N.; 21st, S.W. and N.W.; to S.W. on 22nd. I also have a recollection of an ascent by Mr. Glaisher, a few years ago, passing successively through four opposite currents. On one occasion also, watching the sky, I saw the strange phenomenon of clouds from the four cardinal points, which all met and passed each other in the zenith. At another time, I saw the adverse currents so near, that two masses of rain-cloud from N. and S. passed each other within a few degrees distance, at racehorse speed.

In conclusion, I may say that this diversity of current is not rare, and may frequently be observed in the weather tables of the *Times*. Some years ago their singularity struck me, and their investigation led to some singular results in the foreseeing of weather. One of these results may be seen in the singular barometric elevation of the 27th ult., and the heavy London fogs arising from the shifting, mingling, currents—N., E., S. to N.—I am, Sir, yours, &c.,

R. M.

London, November 17, 1873.

NOVEMBER, 1873.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which ≥ .01 or more fall	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.		
		inches	inches.	in.				Deg.	Date.	Deg.	Date.	In shade	On grass
I.	Camden Town	1.87	— .54	.44	5	14	58.1	23	27.7	13	3	6	
II.	Maidstone (Linton Park)	1.73	— 1.46	.28	1	17	60.0	23	28.0	13	4	...	
"	Selborne (The Wakes)	2.61	— .93	.55	5	15	53.5	23	27.0	4	6	9	
III.	Hitchin	1.87	— .27	.47	2	16	52.0	22*	25.0	12	8	...	
"	Banbury	1.13	— 1.07	.28	2	14	56.0	22†	27.5	4	6	...	
IV.	Bury St. Edmunds (Culford)	2.00	— .39	.38	2	16	54.0	22	25.0	12	9	11	
V.	Bridport	4.28	+ 1.12	.92	2	15	57.0	23¶	27.0	21	2	...	
"	Barnstaple	2.14	— 2.00	.38	26	22	57.0	27	33.0	21	0	...	
"	Bodmin	6.06	+ 1.08	1.66	5	23	58.0	22	31.0	12	2	3	
VI.	Cirencester	2.07	— .72	.51	5	14	...	...	...	...	...	...
"	Shiffnal (Haughton Hall)	1.60	+ .03	.41	5	16	57.0	25	29.0	16**	7	7	
"	Tenbury (Orleton)	1.59	— .88	.48	7	15	59.2	22	27.0	16	8	8	
VII.	Leicester (Wigston)	1.97	— .19	.50	6	14	57.0	22	30.0	12††	8	...	
"	Boston	1.08	— 1.06	.20	6	15	55.0	22	30.0	13	2	...	
"	Grimsby (Killingholme)	1.36	...	.22	5, 7	14	55.0	22†	34.0	13††	0	...	
"	Derby	2.03	+ .40	.45	6	19	56.0	22	32.0	4	1	...	
VIII.	Manchester	2.28	— .48	.33	27	13	55.8	22	27.0	16	3	11	
IX.	York	1.45	— .53	.68	6	12	57.5	28	30.0	13	4	...	
"	Skipton (Arncliffe)	4.66	— 1.79	1.00	6	19	52.0	26	27.0	30	...	...
X.	North Shields	1.30	— 1.40	.31	6	18	57.5	22	32.0	4§§	3	6	
"	Borrowdale (Seathwaite)	10.06	— 6.61	2.17	26	15	...	...	...	...	...	...
XI.	Cardiff (Ely)	2.48	— 1.76	.76	5	13	...	...	...	...	...	...
"	Haverfordwest	3.44	— 2.23	.70	1	17	55.0	22§	28.0	15	6	9	
"	Rhayader (Cefnfaes)	3.30	— 1.28	.70	29	12	54.0	...	31.0	...	...	...
"	Llandudno	1.68	— 1.48	.36	26	13	57.5	26	31.0	16	...	...
XII.	Dumfries	1.83	— 1.39	.36	25	17	56.0	22	25.0	16	8	...	
"	Hawick (Silverbut Hall)	2.37	...	.73	6	13	...	...	...	...	...	...
XIV.	Kilmarnock (Annanhill)	2.22	...	.48	25	14	53.4	29	25.0	16	6	12	
XV.	Castle Toward	5.19	+ .55	1.05	25	14	54.0	23	...	...	...	...
XVI.	Leven (Nookton)	1.97	— 1.07	.55	6	16	53.0	22	26.0	3§§	10	23	
"	Stirling (Deanston)	2.91	— .60	.61	25	21	53.0	28	22.0	16	12	18	
"	Logierait	1.38	...	.26	29	11	55.0	21¶	20.0	15	13	...	
XVII.	Braemar	4.32	+ 2.00	2.14	6	18	50.7	28	19.0	13|||	12	19	
"	Aberdeen	4.57	...	2.73	6	16	53.1	26	27.8	5	4	13	
XVIII.	Inverness (Culloden)	3.18	+ .56	.63	1	16	52.6	28	31.9	15	2	21	
"	Portree	9.52	— .96	1.43	26	20	...	...	...	...	...	...
"	Loch Broom	5.16	...	.90	22	16	...	...	...	...	...	...
XIX.	Helmsdale	2.84	...	.74	27	14	...	...	...	...	...	...
"	Sandwick	4.69	+ .69	1.16	21	18	50.8	28	31.3	5	1	11	
XX.	Caherciveen Darrynane Abbey	4.41	...	1.00	4	24	...	...	...	...	...	...
"	Cork	2.52	...	.76	4	15	...	...	...	...	...	...
"	Waterford	3.17	— .78	.68	4	19	60.0	28	29.0	3	3	...	
"	Killaloe	3.19	— 1.70	.53	26	16	57.0	24	27.0	2	3	6	
XXI.	Portarlington	2.13	— 1.79	.39	1	25	55.0	22	25.0	15	6	...	
"	Monkstown, Dublin	1.85	— 1.04	.45	13	13	56.0	2	20.5	3	5	...	
XXII.	Galway	2.92	...	.65	5	18	57.0	23	29.0	2, 16	2	...	
"	Bunminadden (Doo Castle)	1.86	...	...	...	...	...	...	...	...	...	...
XXIII.	Waringstown	2.00	...	.41	5	16	57.0	15||	27.0	15	8	16	
"	Edenfell (Omagh)	2.09	...	.42	5	15	54.0	24	25.0	15	13	...	

* And 23 & 29. † And 23. ‡ And 29. § 25 & 26. ¶ 28. || 22.

** 21.

†† 13.

‡‡ 16.

§§ 5 & 16.

¶¶ 17.

|| 22.

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

METEOROLOGICAL NOTES ON NOVEMBER.

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, STAPLEHURST.—A fine, mild, and mostly dry month after 10th rendering the roads almost dusty; slight frosts only on 4th, 12th, 13th, and 21st; L on night of 26th and 27th; winds mostly S. and W., and brisk, but not high, on 9th, 15th, 22nd, and 29th. Bar. generally high in the middle of month. Geraniums and similar plants out doors still fresh and growing, and the thrushes and other birds frequently singing as if in April. Fine and dry as the past month has been, I think that the total R is above that of many years in November, but the fact of less than half-an-inch falling during the last twenty days of the month, the unusual absence of fogs, and a very mild atmosphere, have tended to render it one of the most agreeable months on record, and there having been much less frost than in October, vegetation is still in progress.

SELBORNE.—23rd bright meteor seen in N.W. at 7 p.m., leaving a brilliant train. Wind first week S.W. and W. from 8th to 20th, N. and N.E. afterwards, mostly W., very high during the last week. Swallows seen at Chawton House, four miles hence, on 12th, and martins on the 21st; thrushes singing daily to the end of the month. The period of the swallows and martins' disappearance is much later than I have ever known; the latest time recorded by Gilbert White is November 5th. The month on the whole has been favourable, both for fields and gardens. I saw lambs on the 28th.

BANBURY.—High winds on 8th, 9th, 21st, 22nd, 23rd, and 29th; on 22nd, between 11 and 12 a.m., considerable damage caused by gusts of wind from N.W.; trees blown down or broken, and roof of G.W.R. station injured.

CULFORD.—The weather throughout the month has been comparatively mild and singularly free from fogs; easterly winds prevailed on twelve days, and westerly on eighteen; H fell on the 2nd, and high winds prevailed on the 22nd, 23rd, and 29th.

BRIDPORT.—Heavy gale on 1st, accompanied with furious gusts of wind with R and H; gales on 9th and 26th.

BODMIN.—Erratum. Max. for October should have been sent as 68°.

SHIFFNAL.—R daily, with one exception (2nd), till the 11th; either fog or mist most mornings, and the sun seldom visible during the month; the last half much milder than the first, for up to the 21st the max. never exceeded 48°, the average being 44°·5; strong wind from E. and N.E. on 8th, 9th, 10th, and 11th; on 21st the temp. suddenly rose from 44° to 54°, followed by a heavy storm from N.W. on 22nd from 2 to 4 p.m., and again at night; F succeeded next day, and on 25th the temperature again suddenly rose from 49° to 57°, followed by strong wind from W. till the 30th; average max. of this period 51°·5; bar. most unsettled throughout.

ORLETON.—A dry month; very favourable for farming operations, but the sky generally cloudy. R fell on every day except one till the 10th, and very little afterwards; temp. generally steady, and the mean rather more than 2° above the average of the month. The max. 59·2 occurred about midnight on the 22nd, and was followed by a very rough wind. The wind was high again on the 29th. Bar. high, 30·30 on 16th. No T or L during the month.

WIGSTON.—An unusually fine month, which has therefore proved most favourable for wheat sowing.

BOSTON.—6th stormy on E. coast; 7th wrecks in Boston deeps; remarkably fine weather all the month; most beneficial season for farming operations known for many years; temp. 2°·7 above the average, and rainfall considerably below it; several very stormy nights towards the end of the month, on the 21st and 22nd especially; polar wind on 16, equatorial on 14 days.

GRIMSBY.—Upon the whole a remarkably fine month, high winds at the close; November of 1857 was very similar; it then continued very mild through December, but January and February of the following year were severe; November,

1867, was also very fine and dry, and water was scarce in many places. T S at 4.30 p.m. on 3rd; high wind on 1st, 21st, 22nd, 23rd, and from 26th to 29th.

MANCHESTER.—The rainfall here has been greatly below the average of a long period; H on 1st and 7th; lunar halo on 2nd.

ARNCLIFFE.—Violent winds from the W. from 23rd to 30th.

NORTH SHIELDS.—Fine mornings and cloudy afternoons.

SEATHWAITE.—Fifteen days without rain, and only six days on which the fall exceeded half an inch; S on the 1st and T S on 2nd.

W A L E S .

HAVERFORDWEST.—This month has had its usual characteristics of gloom, fog, and B; rather mild; 22nd and 29th very stormy; scarlatina has made its appearance in a rather mild form so far.

CERNFAES.—The month has been mild and temperate, prevailing winds N.W. and N.E.

LLANDUDNO.—Frequent H showers, with wind on 1st; S on the distant hills during all the first week; the month has been dull and foggy, unlike the usual November weather here, although on some days the sun has been bright and warm.

S C O T L A N D .

DUMFRIES.—The first week showery, with occasional frosts at night; from 10th to 21st dry, the longest period without R since the end of April. In May only four consecutive days without R, the same number in June; in July not two together, and only five in the month; in August only four days without R, and these in different weeks; in September six days in the first week, and five in the third; in October five days dry in the last week; in November eleven days at one period; temp. slightly below that of last November. The latter part of the month showery, with frequent gales of wind.

SILVERBUT HALL.—Frost, S, sleet, and high wind on 1st; red butterfly flying about on 15th. A favourable month for getting forward husbandry operations; from 21st to 29th strong westerly winds, the gales falling away in the daytime and gathering force in the night.

KILMARNOCK.—Prevailing winds easterly, the point of greatest frequency being E.N.E. The greatest pressure took place on the 28th, when a violent gale blew up from the N.W.; from the 21st to the 29th the weather was very unsettled, several severe gales taking place, usually in the night, causing great destruction of life and property, both on land and sea. On the night of the 27th the November meteors were not seen, although at 9 p.m. the sky was quite clear, yet by midnight it clouded over and nothing was to be seen.

CASTLE TOWARD.—Rarely have we such favourable weather for all kinds of outdoor work as we have had during this November; so much has been done that labour is well a-head of the season. Prevailing winds E.N.E., latter part of the month W.S.W.; gale on 22nd, and flood on 26th; heavy R on the previous day.

DEANSTON.—A more favourable month than the last, and more clear and fresh than this month generally is. Strong gales on the 7th, 22nd and 23rd; farming operations in a forward state.

ABERDEEN.—H on 1st, 5th, and 8th; L on 2nd, 3rd, 4th, 16th, and 23rd; auroræ on seven nights; heavy floods, especially in smaller streams near the coast on the 7th, fall of 2.73 in. of R on previous day, and S on the hills; bar. pressure below the mean, temp. and rainfall above it; winds from N.E. and N.W. more prevalent than usual, estimated pressure under the average; a month of mild, but rather dull unsettled weather; frequent gales during the first and last weeks.

PORTREE.—First week wet and stormy, with S on high ground; second week fine, enabling the farmers to finish the harvest in good condition; the crop is much above the average, potatoes abundant and of excellent quality; latter part of month very wet and stormy. A continuous gale from W. from 12 p.m. on 21st to 2 p.m. on 23rd, and another heavy gale from S.W. on 27th.

LOCHBROOM.—The best month since June; we had eleven fine days following each other, which we have not had since May; but we have had severe gales, heavy R along with S on the hills, and frost in the straths.

SANDWICK.—The first part of November was remarkably fine, with the exception of the 1st, when a sudden gale came on of 50 and 55 miles an hour, and 0·45 in. of R fell, but from that day to the 20th only 0·22 in. of R fell, while there fell 4·02 in. during the last eleven days, and there were gales on 22nd, 23rd, 24th, 27th, 28th and 29th.

I R E L A N D .

DARRYNANE ABBEY.—Frost on 2nd, H on 1st and 7th, wind from 4th to 20th chiefly N.E., varying to E. and S.E., rest of the month mostly N.W.

MONKSTOWN.—With the exception of the early part, in which there was some smart frost, the month was mostly dry and dark, with very slight variation in temp. during the 24 hours.

DOO CASTLE.—Remarkably fine month.

WARINGSTOWN.—Fine and dry, great progress made with wheat sowing ; temp. above the average.

EDENFELL, OMAGH.—With the exception of the last week the month has been remarkably fine and mild, and very favourable for farming operations.

THE COMING WINTER AND SUMMER.

To the Editor of the Meteorological Magazine.

SIR,—According to several laws it appears nearly certain that the coming winter will be rather severe, and that the Greenwich mean temperature of the winter, will be colder than the average of the last 33 years. I expect that the minimum temperatures of January and February, at Greenwich (which were respectively only 26° and 25° in those months in 1873), will be considerably lower in 1874, although the mean of February may not be so low as in last winter. April, too, will probably be somewhat colder than the average of the last 12 years, at least in mean temperature. It also appears almost certain that we shall have a cool summer, generally ; indeed, cooler than last summer was, owing to the probable absence of such extremely high maxima (on a few days) as in 1873.

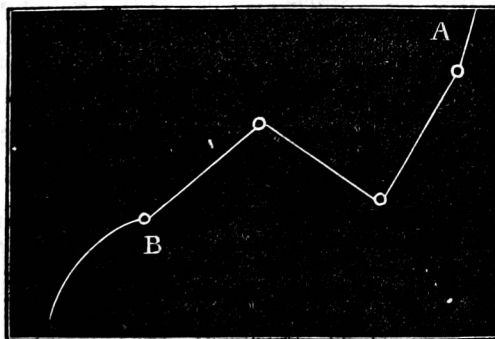
GEORGE D. BRUMHAM.

Barnsbury, November 29, 1873.

REMARKABLE FORM OF LIGHTNING.

To the Editor of the Meteorological Magazine.

SIR,—I send you a sketch of a very remarkable form of lightning which I observed during the severe storm of August 24th. The cloud



from which this form of lightning emanated came off the sea over

Beachy Head, and travelled across the Weald to the westward of this Observatory in the direction of London. I quite satisfied myself of its peculiar form by constantly watching for every flash which occurred in the course of half-an-hour. The first break in the lightning occurred apparently very near the cloud at A, while at B it assumed a curved form before it descended to the earth. Two oak trees were struck and a cow was killed in this immediate locality.—Yours truly,

C. L. PRINCE.

Observatory, Crowborough Beacon, Tunbridge Wells.

BOOKS RECEIVED.

BARBADOES.

RAWSON, THE HON. R. W.—“Rainfall Returns and Diagrams—February to September, 1873.”

BELGIUM.

CAVALIER. M. J.—“Résumé des Observations Météorologiques faites à Ostend en 1862—70,” 4to.

CANADA.

KINGSTON, G. T.—“General Meteorological Register for 1872,” 8vo.

DENMARK.

HOFFMEYER, CAPT.—“L’Institut Météorologique Danois—Daily Observations, April to October, 1873,” oblong 4to.

FRANCE.

“SOCIÉTÉ MÉTÉOROLOGIQUE DE FRANCE—Annuaire, Tome Dix-Huitième, Tableaux, Feuilles, 1—6.”

GREAT BRITAIN.

HARTNUP, J.—“Report of the Astronomer to the Marine Committee, Mersey Docks and Harbour Board, 1871”—Liverpool Printing Company, 1872. 8vo.

MAIN, REV. R.—“Results of Meteorological Observations at the Radcliffe Observatory, Oxford, in 1870.” J. Parker and Co., 1873, large 8vo.

METEOROLOGICAL COMMITTEE.—“Report of the Meteorological Committee of the Royal Society for 1872.” Spottiswoode, 1873, 8vo.

MARLBOROUGH COLLEGE NATURAL HISTORY SOCIETY.—“Seventeenth Half-Yearly Report.” Perkins, Marlborough, 1873, 8vo.

LEWIS, J.—“Digest of the English Census of 1871.” Stanford, large 1873, 8vo.

MELDRUM, C.—“Notes on the Form of Cyclones, &c.” [Reprinted from Monthly Notices, Meteorological Society Mauritius, by the Meteorological Committee.] Stanford, 1873, 8vo.

METEOROLOGICAL COMMITTEE.—“Contributions to our Knowledge of the Meteorology of the Antarctic Regions.” Stanford, 1873, 4to.

ALDRIDGE, E. G.—“Temperature at Ventnor, Helston, and Greenwich—Annual Maximum and Minimum 1848—72.” Single sheet, 4to.

INDIA.

CHAMBERS, C. F.R.S.—“General Remarks on the Climate of Bombay.” 8vo.

ITALY.

RAGONA, [PROF. D.—“Rapporto alla R. Accademia di Scienze, Lettere, ed Arti di Modena sull’opera intitolata Astronomical Observations made at the Royal Observatory, Edinburgh, Vol. XIII.”—Luigi Gaddi, Modena, 1873, 4to.

“Sulle Pioggie di Ottobre, 1872.”

UNITED STATES.

DRAFER, D.—“Report of the Director of New York Meteorological Observatory for 1872,” W. C. Bryant and Co., New York, 8vo, 1873.