LXIV. On the measurement (by trigonometry) of the heights of the principal hills of Wensleydale, Yorkshire

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boring has been carried 250 feet below the surface, but with occasional changes in the strata. What these were I was unable to learn; Mr. Merritt, the proprietor, being absent at the time. While the water of the creek, only a few feet off, is quite sweet, that of the spring is very salt, and copious. It is sometimes very red. Fifty gallons make a bushel of salt, which is very white, and in small and thin irregular tables; 3640 bushels are made in a year, worth on the spot about 550*l.* sterling.

The Parallel Ridge, a mountain overlooking this flat, is composed of the same materials as the chasm of the River Niagara, which have already been declared to be, successively, from below, saliferous sandstone, ferriferous sandstone and slate, calciferous slate, and geodiferous limestone rock. I therefore refer the reader to my account of that river for any additional particulars respecting these strata that may occur in that ridge.

J. J. BIGSBY.

LXIV. *On the Measurement (by Trigonometry) of the Heights of the principal Hills of Wensleydale, Yorkshire.* By JOHN NIXON, Esq.

[Concluded from page 362.]

SOME time previous to the commencement of the survey, the great levels of the horizon-sector had been fitted up with scales divided into equal parts (of about two seconds each), numbered from the end of the scale the nearest to the eye-piece of the telescope progressively to the one next to the object-glass.

The zero of each index (carrying the levels) being placed exactly in a line with that of its graduated arch (fixed to the telescope), on which it moves, the following method was adopted in order to ascertain at what two divisions of its scale the bubble of each level would remain stationary on reversing the telescope within its Ys.

The sector, placed in the shade on a perfectly steady support (such as a rock or well-built wall), having acquired the temperature of the ambient air, the inclination of the telescope was varied until the bubble of either level; for instance, that of the right index, moved to about the middle of its scale. After a lapse of a few minutes, the divisions of the scale coincident with the two extremities of the bubble were read off and registered. In the second place, the telescope was inverted within its Ys, and the corresponding position of the bubble of the left-index level (now uppermost) read off. Lastly, the telescope

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telescope being taken out of its Ys, and replaced reversed in position, the bubble of the left-index level, and afterwards, on inverting the telescope, that of the right-index level, were read off as before. The reversing point of the middle of the bubble of either level being evidently equal to one-fourth of the sum of the readings of the position of its ends in the direct and reversed positions of the telescope, two marks were made with a camel-hair pencil dipped in white paint on the tube of each level, one on each side of, and equidistant from the reversing point by half the length of the bubble.

The sector had been transported in the course of the survey in vehicles of every description over the roughest roads imaginable; yet the great levels, as will be evident from the subjoined statement of the position of their reversing points at the several stations, had retained their first adjustments to the accuracy of a second or two.

		Right Index.	Left Index.	Mean.
Reversing point at	Bear's Head	67°	74°	70°·5
—————	Shunnor Fell . . .	66	72	69
—————	Bakestone Edge .	62·5	76	69
—————	Penhill	65	76·5	71
— (July 9th)	Settronside	61·5	76·5	69
— (July 10th)		65·5	75	70
		Mean		70°

Heretofore the vertical angle could not be measured until the ends of the bubble were made to coincide exactly with the reversing marks; but on the addition of scales to the levels, the angle read off could be corrected for any slight deviation of the bubble from its marks, by noting the contemporary position of the ends of the bubble. To understand the nature of this correction, it is to be observed, that when the telescope is pointed at an elevated object, and the index moved until the bubble of its level comes to rest at its marks, the zero of the index will be *lower* than that of the graduated arch (fixed to the telescope) by the arc of elevation. Consequently, on subsequently elevating the index in a slight degree, the two zeros will be brought nearer to each other; the displaced bubble, advancing in the direction of the object-glass, will come to rest with its middle point opposite a number in the scale exceeding that of the reversing point; and the angle of elevation now read off on the graduated arc, will be in defect by the angular displacement of the bubble. Hence the registered angles of elevation will require correcting by the difference in seconds of the half-sum of the readings of the position of the ends of the bubble and that of the reversing point; additive or subtractive

subtractive according as the half-sum exceeds or falls short of the reversing point. For angles of depression the correction is to be applied with the contrary signs. The value of one division (of forty to the inch) of the right-index level is $1''.91$; that of the left-index level $2''.12$.

On calculating the cylindrical error of the sector from measurements by the scales, substituted for those previously obtained by the divided arcs, its amount was determined to be $20''$, instead of $11''$ as last stated; the discrepancy arising principally from a gross error existing in the formula*.

The ground about the station at Penhill being an almost impassable bog destitute of rocks, the tripod of the theodolite, having a firm board screwed to it, was fixed on the turf-mound already described. From the elastic nature of the materials of the mound, the slightest change in the position of the observer displaced the bubble of the level several minutes, and threatened to render the accurate measurement of the angles utterly impracticable. Fortunately, after abandoning various plans of overcoming the difficulty, the following method of conducting the observations was tried and found to succeed extremely well. An approximate measurement being effected, the weight of the body was thrown for a moment on one foot, and a light stone, placed on the board, moved gradually in the proper direction until the line of collimation pointed exactly at the base of the signal. Averting the head as slightly as possible, the position of the bubble was then read off at one rapid glance, and the eye replaced as instantaneously at the telescope, to ascertain that its direction remained unvaried. Tedious and difficult as was the method in execution, it was gratifying to find that the results equalled in accuracy the measurements effected in the usual way at Settronside with the sector placed on a wall, or supported, as at the other stations, on firm piles of stones surmounted by a heavy flag.

The observed refractions, with their deviations from the mean value, about 1-17th, are stated below:

	Arc.	Refr.	Deviat.
Shunnor Fell and Bakestone Edge	$4' 19''$	$-17''$	$-32''$
Bear's Head and Whaw Fell	4 36	+19	+ 3
Bakestone Edge and Bear's Head	5 6	19	+ 1
Penhill and Settronside	5 39	17.5	-2.5
Bear's Head and Shunnor Fell	5 51	12	- 9
Settronside and Bear's Head	6 20	27	+ 5
Shunnor Fell and Knoutberry Hill	6 21	16	- 6

* Some time in the course of the present year I hope to be able to furnish your readers with a complete treatise "On the constant Error of Collimation of a Telescopic Level."

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	Arc.	Refr.	Deviat.
Dod Fell and Shunnor Fell	6' 55"	19"	— 5"
Penhill and Bakestone Edge	7 40	26	— 1
Bakestone Edge and Settronside	8 47	41	+ 10
Bear's Head and Penhill	8 49	25.5	— 5.5
Penhill and Dod Fell	10 36	49	+ 12
Shunnor Fell and Settron Fell	11 38	37	— 4
Penhill and Pen-y-gent	12 40	40	— 5
Sum (rejecting the first)	1° 40 50	5' 48	
Mean refraction 1-17th.			

The registers of the measurements by the horizon-sector will require explanation. The *first* column contains the name of the hill of which the ground, unless otherwise stated, had been observed; the *second*, the mean of the readings by the two indices of the elevation or depression, each corrected for the constant error of the instrument and the deviation of the bubble from its reversing point; the *third*, the difference of level of the *cam* at Penhill, the walls at Settronside and Pen-y-gent, and the ground at the other stations and the summit or other given part of the observed hill; the latter being higher or lower than the former according as the difference is marked H or L.—The *last* column, given merely as a test of the goodness of the observations, exhibits the difference between the error of collimation of each (pair of) observations, and the mean error of the whole†.

At Settronside Wall.

The measurements marked* were made July 9th, 1828; a cold but clear day accompanied by a tremendous wind; the others were made on the following day, of which the earlier part proved remarkably bright and clear, but was succeeded by partial mists.

Height of the eye above the wall 0.5 feet.

		Feet.
*Penhill, <i>Cam top</i>	51' 22" depr.	... 8"
	51 15 —	489.0 L. 0
*Little Whernside	50 36 —	... 7
	50 24 —	318.1 7
*Rover Crag	65 38 —	... 0
	65 30 —	754.3 4
*Great Haw	50 46 —	518.8 1
Yockenthwaite Moor	37 35 —	195.2 4
Bear's Head	28 22 —	287.3 1
Lovely Seat	9 25 —	87.9 3

† In the calculations the refraction has been considered to be without exception 1-17th of the contained arc.

Bakestone

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			Feet.	
Bakestone Edge	28' 16"	depr.	379·3	L. 4"
Caldberg Moor†	67 0	—	946·7	2
Whitfield Hill, <i>Wall top</i>	54 10	—	948·3	2
Wasset Fell	2° 11 28	—	429·7	5
Stake Fell	1 22 25	—	463·2	0
*Great Whernside	0 49	—	. . .	0
	1 2	—	4·1H.	6
Ingleborough	2 8	—	68·3	3
Shunnor Fell	2 56	—	46·1	6

At the Bear's Head.

June 26, 1828. A cold, clear, blustery afternoon. Height of eye 4 feet.

			Feet.	
Ten End	40' 0"	depr.	98·8	L. 11"
Whaw Fell	24 55	—	182·4	15
Bakestone Edge	13 22	—	96·4	4
High Fleak	22 32	—	209·0	5
Pickington Ridge	15 38	—	164·7	9
Whitfield Hill, <i>Wall top</i>	36 52	—	677·2	1
Addlebrough	66 36	—	452·1	3
Penhill, <i>Cam top</i>	17 5	—	202·7	4
Harlen Fell	21 1	—	254·6	3
Stake Fell	28 7	—	175·2	4
Wasset Fell	15 54	—	140·6	2
Brownhaw	12 3	—	113·1	10
Little Whernside	6 53	—	41·1	4
Great Haw	16 45	—	234·2	1
Shunnor Fell	29 12	elev.	. . .	10
	29 19	—	333·8	H. 2
Ingleborough	16 6	—	. . .	5
	16 17	—	354·5	3
Lovely Seat	22 11	—	196·0	2
The Sayls	12 10	—	172·8	1
Pillar Hill	14 45	—	244·7	3
Swarth Fell	10 58	—	219·6	1
Knoutberry Hill	20 53	—	189·8	2
Dod Fell	44 29	—	175·9	4
Yockenthwaite Moor	12 32	—	93·7	3
Settronside, <i>Wall top</i>	22 32	—	289·1	2
Wildboar Fell	15 16	—	316·2	4

† It is very probable that a rock had been mistaken for the signal.

At Shunnor Fell.

June 27, 1828. Excessively sultry, calm and hazy.

	Height of eye 4 feet.		Feet.	
Pillar Hill	23'	56" depr.	91·0	L. 6"
The Sayls	43	13 —	161·0	14
Swarth Fell	15	36 —	115·6	10
Wildboar Fell	5	34 —	25·8	5
Lovely Seat	39	31 —	135·2	6
Bakestone Edge	58	53 —	...	7
	58	43 —	431·8	12
Bear's Head	35	29 —	336·9	2
Settronside, <i>Wall top</i>	7	41 —	48·5	10
Pickington Ridge	39	12 —	501·6	9
Water Crag	18	19 —	159·6	7
Knoutberry Hill	15	56 —	143·5	1
Dod Fell	16	37 —	162·3	1
Hugh Seat†	5	44 —	...	6

At Bakestone Edge.

June 30, 1828. Very hazy, with a hot sun and a cloudless sky; frosty in the evening.—Height of eye 4·5 feet.

			Feet.	
Ten End	3'	30" depr.	5·0	L. 3"
Stake Fell	10	55 —	79·2	4
Pickington Ridge	12	20 —	66·9	9
High Fleak	39	56 —	114·2	
Penhill, <i>Cam top</i>	11	27 —	105·5	6
Little Whernside	1	52 —	59·1	H. 6
Bear's Head	7	57 elev.	96·8	4
Lovely Seat	64	55 —	293·2	1
Shunnor Fell	53	9 —	426·1	5
Water Crag	25	10 —	265·1	4
Settronside, <i>Wall top</i>	20	33 —	384·5	3
Yockenthwaite Moor	10	51 —	188·8	1
Great Whernside	12	42 —	385·4	1

At Penhill Cam.

July 1, 1828. A sultry, misty morning succeeded by a clear but rather blustry evening.

Height of the eye above the Cam top 4 feet.

			Feet.	
Harlen Fell	30'	40" depr.	51·9	L. 2"
Great Haw	6	36 —	31·0	0

† Miscalled Cotterfell in the last survey.

Addleborough

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			Feet.	
Addlebrough	30' 58"	depr.	253·7	L. 3"
High Fleak	3 48	—	7·6	4
Caldberg Moor	66 11	—	447·8	5
Stake Fell	0 0	—	25·5	H. 2
Setttronside, <i>Wall top</i>	45 46	elev.	. . .	1
	45 50	—	488·2	6
Great Whernside	37 43	—	494·2	5
Wasset Fell	5 51	—	56·9	13
Brown Haw	11 16	—	93·7	4
Little Whernside	18 40	—	170·2	10
Bear's Head	8 37	—	199·6	13
Pickington Ridge	1 44	—	41·2	3
Bakestone Edge	4 2	—	105·0	2
Yockenthwaite Moor	18 50	—	293·4	5
Lovely Seat	18 23	—	399·7	6
Shunnor Fell	20 2	—	534·3	2
Dod Fell	15 11	—	377·7	3
Pen-y-gent, <i>Wall top</i>	15 11	—	471·1	5

At Ingleborough.

June 14th and 18th, 1822.—Height of eye 4 feet.

			Feet.
Great Whernside	9' 0"	depr.	65·6 L.
Shunnor Fell	7 10	—	24·4

At Whernside.

July 4th and 6th, 1827.—Height of eye 4 feet.

			Feet.
Ingleborough	8' 47"	depr.	42·6 L.
Shunnor Fell	8 27	—	67·3

At Knoutberry Hill†.

July 5th, 1827.—Height of eye 4 feet.

			Feet.
Ingleborough	9' 34"	elev.	167· H.
Shunnor Fell	9 25	—	141·3
Great Whernside	1 55	depr.	100·7

At Pen-y-gent Wall.

July 11th, 1827.—Height of the eye above the wall 9 inches.

			Feet.
Ingleborough	7' 8"	elev.	89·3 H.
Shunnor Fell	2 52	depr.	65·1
Great Whernside	2 23	—	24·2
Penhill, <i>Cam top</i>	26 43	—	474·5 L.

† In the last survey for Noughtberry Hill read Knoutberry Hill.

At

At Dod Fell.

August 25th, 1827.—Height of eye 4 feet.

			Feet.
Penhill, <i>Cam top</i>	24' 35"	depr.	370·5 L.
Ingleborough	9 50	elev.	180·4 H.
Shunnor Fell	9 41	—	160·3
Great Whernside	1 40	—	118·4

At Wharw Fell.

September 15th, 1824, and March 29th, 1825.

			Feet.
Ingleborough	46' 17"	elev.	536·3 H.
Shunnor Fell	35 29	—	512·0
Bear's Head	19 57	—	183·1

At Great Whernside.

April 15th, 1822.

Height of the eye above the loftiest rock 1 foot.

			Feet.
Swarth Fell†	10' 7"	depr.	70·5 L.
Penhill Beacon	50 19	—	635·4

Calculation of the mean Differences of Level and Heights of the Stations.

<i>Ingleborough above Great Whernside.</i>			<i>Ingleborough above Shunnor Fell.</i>		
		Feet.			Feet.
By Obs. at {	Ingleborough	65·6	By Obs. at {	Settronside	22·2
	Settronside	64·2		Bear's Head	20·7
	Knoutberry Hill	67·0		Whernside	24·7
	Pen-y-gent	65·1		Knoutberry Hill	26·4
	Dod Fell	62·0		Pen-y-gent	24·2
	Corrected mean	—64·6		Dod Fell	20·1
	Height of Ingleborough	2374·6		Whaw Fell	24·3
	Great Whernside	2310·0		Ingleborough	24·4
<i>Shunnor Fell above Great Whernside.</i>			Corrected mean		—23·3
By Obs. at {	Settronside	42·0	Height of Ingleborough		2374·6
	Bakestone Edge	40·7		Shunnor Fell	2351·3
	Penhill	40·1	Do. compared with Great Whernside	}	2351·2
	Ingleborough	41·2			
	Knoutberry Hill	40·6		Mean	2351·3
	Pen-y-gent	40·9			
	Dod Fell	41·9			
	Corrected mean	+41·1			
	Height of Great Whernside	2310·0			
	Shunnor Fell	2351·1			

† The observation was made six years previous to the erection of the signal.

Shunnor

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<i>Shunnor Fell above Settronside Wall.</i>		<i>Great Whernside above Bear's Head.</i>	
	Feet.		Feet.
By Obs. at {		By Obs. at {	
Bear's Head	44.7	Settronside	291.4
Shunnor Fell & Settronside	47.3	Bakestone Edge	288.6
Bakestone Edge	41.6	Penhill	294.6
Penhill	46.1	Corrected mean	291.9
Corrected mean	44.7	Height of Great Whernside	2310.0
Height of Shunnor Fell	2351.3	———— Bear's Head	2018.1
———— Settronside Wall	2306.6		

<i>Ingleborough above Settronside Wall.</i>		<i>Settronside above Bear's Head.</i>	
By Obs. at {		By Obs. at {	
Settronside	68.3	Settronside & Bear's Head	288.2
Bear's Head	65.4	Shunnor Fell	288.4
Shunnor Fell & Ingleborough	72.9	Bakestone Edge	287.7
Corrected mean	68.6	Penhill	288.6
Height of Ingleborough	2374.6	Corrected mean	288.2
———— Settronside Wall	2306.0	Height of Settronside Wall	2306.1
		———— Bear's Head	2017.9
		Do. compared with Great Whernside	2018.1
		———— Shunnor Fell	2019.3
		———— Ingleborough	2019.2
		Mean	2018.6

<i>Great Whernside above Settronside Wall.</i>		<i>Ingleborough above Penhill Cam.</i>	
By Obs. at {		By Obs. at {	
Settronside	4.1	Settronside	557.3
Bakestone Edge	0.9	Bear's Head	557.2
Penhill	6.0	Pen-y-gent	563.8
Corrected mean	4.2	Dod Fell	550.9
Height of Great Whernside	2310.0	Corrected mean	556.8
———— Settronside Wall	2305.8	Height of Ingleborough	2374.6
Do. compared with Inglebro'	2306.0	———— Penhill Cam	1817.8
———— Shunnor Fell	2306.6		
Mean	2306.1		
Height of Wall above ground	1.6		
———— Summit of Settronside	2304.5		

<i>Ingleborough above Bear's Head.</i>		<i>Shunnor Fell above Penhill Cam.</i>	
By Obs. at {		By Obs. at {	
Settronside	355.6	Settronside	535.1
Bear's Head	354.5	Bear's Head	536.5
Shunnor Fell & Inglebro'	361.3	Bakestone Edge	531.6
Whaw Fell	353.2	Penhill	534.3
Corrected mean	355.4	Pen-y-gent	539.6
Height of Ingleborough	2374.6	Dod Fell	530.8
———— Bear's Head	2019.2	Corrected mean	534.6
		Height of Shunnor Fell	2351.3
		———— Penhill Cam	1816.7

<i>Shunnor Fell above Bear's Head.</i>		<i>Great Whernside above Penhill Cam.</i>	
By Obs. at {		By Obs. at {	
Settronside	333.4	Settronside	493.1
Bear's Head & Shunnor Fell	335.3	Bakestone Edge	490.9
Bakestone Edge	329.3	Penhill	494.2
Penhill	334.7	Pen-y-gent	498.7
Whaw Fell	328.9	Dod Fell	488.9
Corrected mean	332.0	Corrected mean	492.9
Height of Shunnor Fell	2351.3	Height of Great Whernside	2310.0
———— Bear's Head	2019.3	———— Penhill Cam	1817.1

Settronside

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<i>Settronside Wall above Penhill Cam.</i>		<i>Shunnor Fell above Bakestone Edge.</i>	
	Feet.		Feet.
By Obs. at { Penhill and Settronside	488.6	By Obs. at { Settronside	425.4
{ Bear's Head	491.8	{ Bear's Head	430.2
{ Bakestone Edge	490.0	{ Shunnor Fell & Bake- } 429.0	
Corrected mean	—489.8	{ stone Edge }	
Height of Settronside Wall	2306.1	By Obs. at { Penhill	429.3
———— Penhill Cam	1816.3	Corrected mean	—428.9
		Height of Shunnor Fell	2351.3
		———— Bakestone Edge	1922.4
<i>Bear's Head above Penhill Cam.</i>		<i>Bakestone Edge above Penhill Cam.</i>	
By Obs. at { Settronside	201.7	By Obs. at { Settronside	109.7
{ Bear's Head and Penhill	201.1	{ Bear's Head	106.3
{ Bakestone Edge	202.3	{ Penhill and Bakestone Edge	105.2
Corrected mean	—201.7	Corrected mean	+107.0
Height of Bear's Head	2018.6	Height of Penhill Cam	1817.0
———— Penhill Cam	1816.9	———— Bakestone Edge	1924.0
Do. compared with Inglebro'	1817.8		
———— G ^r Whernside	1817.1		
———— Shunnor Fell	1816.7		
———— Settronside	1816.3		
Mean	1817.0		
The top of the Cam is about level with the highest point of Penhill.		<i>Settronside Wall above Bakestone Edge.</i>	
		By Obs. at { Settronside and Bake- }	381.9
		{ stone Edge }	
		By Obs. at { Bear's Head	385.5
		{ Shunnor Fell	383.3
		{ Penhill	383.2
		Corrected mean	—383.6
		Height of Settronside Wall	2306.1
		———— Bakestone Edge	1922.5
<i>Ingleborough above Bakestone Edge.</i>		<i>Bear's Head above Bakestone Edge.</i>	
By Obs. at { Settronside	447.6	By Obs. at { Settronside	92.0
{ Bear's Head	450.9	{ Bear's Head & Bakestone }	
{ Shunnor Fell and Inglebro'	456.2	{ Edge }	96.6
Corrected mean	—451.1	By Obs. at { Shunnor Fell	94.9
Height of Ingleborough	2374.6	{ Penhill	94.6
———— Bakestone Edge	1923.5	Corrected mean	—95.0
		Height of Bear's Head	2018.6
		———— Bakestone Edge	1923.6
		Do. compared with Penhill	1924.0
		———— Inglebro'	1923.5
		———— G ^r Whernside	1923.4
		———— Shunnor	1922.4
		———— Settronside	1922.5
		Mean	1923.2
<i>Great Whernside above Bakestone Edge.</i>			
By Obs. at { Settronside	383.4		
{ Bakestone Edge	385.4		
{ Penhill	389.2		
Corrected mean	—386.6		
Height of G ^r Whernside	2310.0		
———— Bakestone Edge	1923.4		

In the following Table are given, for every hill, its height as determined from the stations at the head of the column; the claims to accuracy of the different values of the altitude being considered in the calculation of the *mean* (contained in the last column), to be *reciprocally* as the distance of the station to the hill.

Hills.

Heights of the principal Hills of Wensleydale, Yorkshire. 441

Hills.	STATIONS.						Mean Heights. Feet.
	Bear's Head.	Shunnor Fell.	Setttronside.	Bakestone Edge.	Penhill.	Great Whernside.	
Pillar Hill	2263.3	2260.3	.....	.....	.....	.....	2261.0
The Sayls	2191.4	2190.3	.....	.....	.....	.....	2190.6
Swarth Fell	2238.2	2235.7	.....	.....	.....	2239.5	2237.0
Lovely Seat	2214.6	2216.1	2218.2	2216.4	2216.7	.....	2216.1
High Fleak	1809.6	.....	.....	1809.0	1809.4	.....	1809.3
Pickington Ridge ...	1853.9	1849.7	.....	1856.3	1858.2	.....	1855.2
Whitfield Hill, <i>Wall</i>	1341.4	.....	1357.8	.....	.....	.....	1350.5
Caldberg Moor .....	.....	.....	.....	.....	1369.2	.....	1369.2
Rover Crag .....	.....	.....	1551.8	.....	.....	.....	1551.8
Great Haw	1784.4	.....	1787.3	.....	1786.0	.....	1786.1
Little Whernside	1977.5	.....	1988.0	1982.3	1987.2	.....	1985.4
Brownhaw	1905.5	.....	.....	.....	1910.7	.....	1909.3
Harlen	1764.0	.....	.....	.....	1765.1	.....	1765.0
Penhill Beacon .....	.....	.....	.....	.....	.....	1674.6	1674.6
Wasset Fell	1878.0	.....	1876.4	.....	1873.9	.....	1876.0
Yockenthwaite Moor	2112.3	.....	2110.9	2112.0	2110.4	.....	2111.4
Stake Fell	1843.4	.....	1842.9	1844.0	1842.5	.....	1843.2
Addlebrough	1566.5	.....	.....	.....	1563.3	.....	1565.1
Ten End	1919.8	.....	.....	1918.2	.....	.....	1919.5
Mean error	-1.1	-1.6	+1.8	-0.3	0.0	+2.5	

Reciprocal observations by the four-inch theodolite gave 185.4 feet for the height of Rover Crag above Caldberg Moor, whence we get $(1551.8 - 185.4 =) 1366.4$ for the altitude of the latter; or 2.8 feet less than by the measurement from Penhill. The height of the Moor, as determined at Setttronside (1359.4) is rejected because the signal could not be satisfactorily identified.

The wall on Whitfield Hill being about $5\frac{1}{2}$ feet high, we have 1345.4 feet for the altitude of the ground at the summit.

My next will contain a few barometrical measurements and geological notes made in Wensleydale and the Yorkshire portion of Lunedale.

Leeds, April 2, 1829.

JOHN NIXON.