night and the next day into New England. Heavy gales prevailed on the middle Atlantic and New England coasts, with velocities ranging from 40 to 68 miles per hour. After the two lows united the intensity of the storm increased. The barometer on the morning of the 27th read 29.16 at Yarmouth, N. S. The gales over the lakes and the north Atlantic coast continued until the 28th.

XIII.—The centre of this low area was first located north of Montana. It moved southeastward and was over the Lake region on the 28th, and was accompanied by snow. On the 29th the centre was in the Saint Lawrence Valley and it then passed over Nova Scotia. Snow, with northwest gales, prevailed over the Lake region on the 29th, and on the New England coast on the 28th and 29th.

XIV.—The centre of this low area appeared in Montana on the 29th, was over South Dakota on the 30th, and in Kansas on the 31st. The night map of the last day of the month shows that rain or snow storms prevailed over the entire country east of the Rocky Mountains, and violent northerly gales with snow from North Dakota southward to Kansas.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date.
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	1	51	100	47	60	2.5	33	Sydney, C. B. I	.60	3	Halifax, N.S	27	1	Nantucket, Mass	nw.	36	2
II	2	51	110	31	80	3.0	40	Portland, Me	.70	4	Nashville, Tenn	27	3	Block Island, R. I	nw.	56	4
III	5	50	113	47	76	2.5	35	Parry Sound, Ont	.48	7	Northfield, Vt	21	8	Nantucket, Mass	nw.	34	7
IV	10	51	115	46	62	6.0	33	Qu'Appelle, N. W. T	.60	10	Rapid City, S. Dak	21	13	Block Island, R. I	nw.	46	12
V*a*	14	42	124	35	74	6.0	29	White River, Ont	.52	18	Toronto, Ont	22	19	New York City	nw.	44	18
V*b*	18	52	97	35	74	2.5	32										
VI	20	40	124	32	84	3.0	35	Qu'Appelle, N. W. T	.50	20	Rockliffe, Ont	29	22	Saugeen, Ont	nw.	38	21
VII	22	54	115	47	58	4.5	26	Swift Current, N. W. T	.74	22	Saint Vincent, Minn	33	22	Grand Haven, Mich	nw.	52	23
VIII	26	38	109	28	84	2.5	28	Saint Vincent, Minn	.76	26	.....do	35	26	Fort Sully, S. Dak	nw.	56	26
Mean						3.6	32		.61			27				45	
Low areas.									Fall.			Rise.					
I	1	42	82	37	77	0.5	33	Norfolk, Va	.16	1	Chattanooga, Tenn	23	1	Hatteras, N. C	sw.	24	1
II	1	47	124	45	68	3.0	47	Chatham, N. B	1.08	4	Chatham, N. B	41	4	Block Island, R. I	s.	42	3
III	3	48	124	36	74	5.5	32	Red Bluff, Cal	.46	3	Nashville, Tenn	23	5	Red Bluff, Cal	se.	42	3
IV	6	48	85	47	59	1.5	42	Chatham, N. B	.70	7	Halifax, N.S	19	6	Block Island, R. I	e.	38	6
V	7	53	111	49	87	1.0	42	Port Arthur, Ont	.46	8	Marquette, Mich	20	8	Marquette, Mich	sw.	38	8
VI	8	54	110	47	59	3.0	36	Halifax, N.S	.46	11	Kingston, Ont	24	9	Northfield, Vt	s.	30	11
VII	11	43	81	44	63	1.5	28	Boston, Mass	.16	12	Portland, Me	7	12	New York City	nw.	36	12
VIII	12	48	125	49	84	2.5	35	Prince Albert, N. W. T	.86	12	Minnedosa, Man	23	13	Marquette, Mich	w.	30	14
IX	14	53	114	47	58	4.5	38	Sydney, C. B. I	.96	18	Chatham, N. B	13	18	Block Island, R. I	ne.	82	17
X	18	47	124	46	58	4.0	37	Northfield, Vt	.42	21	Northfield, Vt	27	21	.....do	sw.	34	21
XI	21	51	112	49	61	3.0	35	White River, Ont	.62	22	.....do	21	26	Marquette, Mich	sw.	36	22
XII*a*	24	33	104	48	64	3.0	40	Yarmouth, N.S	1.18	27	Yarmouth, N. S	27	27	Block Island, R. I	e.	68	26
XII*b*	25	48	122	44	66	2.0	56										
XIII	27	53	109	43	64	2.0	50	Milwaukee, Wis	.62	28	Milwaukee, Wis	28	23	Chicago, Ill	sw.	48	28
XIV	29	54	102	37	97	2.5	33	Wichita, Kans	.34	31	Concordia, Kans	15	30	Pueblo, Colo	w.	34	30
Mean						2.6	39		.60			21				42	

NORTH ATLANTIC STORMS FOR DECEMBER, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during December, 1890, are shown on chart I. These paths have been determined from international observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Among the more notable features of the month were the abnormal southerly course of storms over the eastern part of the ocean, the low pressure which prevailed off the coast of southern Europe during the first two decades of the month, and an unusual prevalence of stormy weather, more especially over the western part of the ocean.

Fifteen storms have been traced for December, 1890, the average number traced for December during the last 7 years being 10.3. The greatest number of storms previously traced for December was 13, in 1887 and 1889, and the least number was 7, in 1884. Of the storms traced for the current month 11 advanced from west of the 60th meridian; one apparently originated east of the Azores; 2 first appeared over mid-ocean between the 50th and 60th parallels; and one moved from high latitudes south of east over or north of the British Isles. 4 storms traversed the ocean from coast to coast.

On the 1st a storm which was central November 30th about midway between Bermuda and the south Atlantic coast was located south of Cape Breton Island in latitude about N. 41°, with pressure falling to about 28.00 (711) and gales of hurricane force. By the 2d this storm had passed to northeast of Newfoundland, with an appreciable loss of energy, after which it disappeared north of the region of observation. This was the severest storm of the month. At Saint John's, N. F., the gale of the 1st was reported the heaviest in 40 years, and the barometer fell to 28.31 (719) at 11 p. m. The force of the wind was estimated at 70 to 80 miles per hour. Houses, trees, etc., were blown down, and great destruction was caused to shipping off Newfoundland and Nova Scotia, and in the Gulf of Saint Lawrence. On the 1st a storm of considerable strength was central south of Iceland, whence it apparently moved south of east over or north of Scotland. On the 2d a storm was central west of the Spanish Peninsula, whence it moved slowly northeastward to the Bay of Biscay, where it was central on the 5th and 6th, after which its course cannot be traced with reports at hand. On the morning of the 4th a storm of considerable strength was central in New England, whence it passed northeastward over Newfoundland beyond the region of observation, attended by very severe gales over Nova Scotia and Cape Breton Island. On the morning of the 7th a storm was central over Nova Scotia, whence it moved to the northeast of Newfoundland by the 8th, with heavy gales, and pressure falling to 28.72 (729) at Saint John's, N. F., at 7 a. m. of the 8th. By the 9th the storm-centre had advanced northeastward to the 40th meridian, without an appreciable loss of energy, after which it moved east and south of east and disappeared over the Bay of Biscay after the 11th. During

the 7th and 8th a storm of moderate strength moved north of east from mid-ocean in high latitudes and disappeared beyond the region of observation after the 8th. On the 9th a storm which had apparently advanced from northwest of Bermuda was central between Bermuda and the Grand Banks, whence it moved to south of the Grand Banks by the 10th, after which it recurved northward over the east edge of the Grand Banks, and after the 11th united with a depression which had advanced from Nova Scotia during the 11th and morning of the 12th. By the 13th this storm had moved rapidly north of east to the 25th meridian, after which it disappeared beyond the region of observation. On the 14th and 15th a disturbance occupied the ocean west of the Bay of Biscay and the Spanish Peninsula. On the morning of the 12th a storm of considerable strength was central south of Nova Scotia, whence it moved to north Newfoundland by the 13th, and north of east to the 40th meridian by the 14th, after which it passed south of east, and apparently disappeared over the Bay of Biscay after the 15th. On the evening of the 16th a storm appeared off the south Atlantic coast, to which position it had apparently advanced from the southeast. During the 17th this storm moved northward along the south and middle Atlantic coasts, and on the morning of the 18th was central southwest of Nova Scotia, with pressure below 29.30 (744). By the morning of the 19th the storm was central over north Newfoundland, with pressure below 28.80 (731), whence it moved northeastward to the 50th meridian by the 20th, without an appreciable loss of energy. By the 21st the storm had moved north of east to about the 33d meridian, after which it disappeared north of the region of observation. On the 16th a storm appeared over mid-ocean, and moved southeastward to the 50th parallel in about W. 23° by the 17th, and by the 19th was apparently central west of Ireland, where pressure 29.20 (742) was reported. The storm apparently remained in that region during the 19th, after which it disappeared beyond the region of observation, having apparently passed southeast of the British Isles. On the 23d a storm was central northeast of Newfoundland, to which position it had advanced from the Gulf of Saint Lawrence. By the 24th the storm had moved rapidly eastward to about the 25th meridian, after which it recurved to the northward and disappeared north of the region of observation. This storm was apparently deflected to the northward by high pressure over and south of the British Isles. On the 24th a storm was central north of Newfoundland, having advanced from the Saint Lawrence Valley, whence it moved east and south of east to about the 23d meridian by the 27th, after which it apparently recurved northward under the influence of high pressure to the eastward. On the morning of the 27th a storm was central off the New England coast, to which position it had advanced from the middle Atlantic coast, whence it moved northeast over the Gulf of Saint Lawrence by the 28th, after which date it disappeared north of the region of observation. This storm exhibited marked energy on the 27th and 28th. On the morning of the 30th a storm was central south of Newfoundland, having advanced eastward over New England and Nova Scotia, and by the morning of the 31st the storm-centre had moved to northeast of Newfoundland, where a moderate display of energy was shown.

OCEAN ICE IN DECEMBER.

The only Arctic ice reported was a large iceberg in N. 49° 39′, W. 47° 50′, on the 13th. The Strait of Canso was reported full of ice on the 27th. In December, 1882, 1883, 1884, 1886, and 1888, no Arctic ice was reported near Newfoundland and the Grand Banks. In 1885 several icebergs were observed off the Newfoundland coast the latter part of the month. In 1887 a small iceberg was reported in N. 46° 10′, W. 47° 28′ on the 26th, and a small iceberg in N. 48° 20′, W. 48° 40′ on the 28th.

FOG IN DECEMBER.

The limits of fog-areas west of the 40th meridian, as determined by reports of shipmasters, are shown on chart I by dotted shading. East of the 55th meridian fog was reported on 3 dates. No fog was reported west of the 55th meridian. Compared with the corresponding month of the last 3 years the dates of occurrence of fog near the Grand Banks in December, 1890, was 2 less than the average. The average number of foggy days between the 55th and 65th meridians in December, as shown by reports of the last 3 years is 4, and west of the 65th meridian the average number is 3. On the dates fog was reported near the Grand Banks for the current month, the 11th, 28th, and 29th, it occurred with the approach of general storms from the westward. On the 3d, 6th, 17th, and 26th, dense fog was reported at points along the New England, New York, and New Jersey coasts with the approach of general storms.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

Many of the voluntary stations do not have standard thermometers or shelters.

The distribution of mean temperature over the United States and Canada for December, 1890, is exhibited on chart II by dotted isotherms. In the table of Signal Service data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature was highest in extreme south Florida, where it was above 65, and the mean values were above 60 over the southern half of the Florida Peninsula, in the lower Rio Grande valley, and in extreme south California and southwest Arizona. The mean temperature was lowest in north New England and the Saint Lawrence Valley, where it was below 10, and the mean readings were below 20 north of a line traced from extreme south New Hampshire westward to northeast Pennsylvania, thence northward over central New York, and thence west-northwest over south Manitoba. The mean temperature was also below 20 at stations in central Idaho and Wyoming.

The mean temperature was above the normal, except from the east part of the upper lake region eastward and southward to the Atlantic coast, and on the middle Pacific coast and the west part of the middle plateau region. The greatest departure above the normal temperature occurred in the British Possessions north of Montana, where it was more than 15, and the departure above the normal exceeded 5 over the northern part of the country between the 87th and 120th meridians, and thence to north Texas. The departure above the normal also exceeded 5 on the extreme south Pacific coast and in southwest Arizona. The most marked departure below the normal temperature occurred in the Saint Lawrence Valley and thence southward to the west Maine coast, where it exceeded 10, and the departure below the normal exceeded 5 generally in New York, New England, and the Canadian Maritime Provinces.

A notable feature of the distribution of temperature for the month was the cool weather which prevailed over the northeast part of the country, and the unusual warmth of the season in the north-central districts. At Montreal, Quebec, where the normal temperature for December is 14 above that of Saint Vincent, Minn., and 5 above that of Bismarck, N. Dak., the mean temperature for the current month was 12 and 18 below