

Special Severe Winds.—2d, Blue Blanket Plains, Dak., terrible north "blizzard";* 3d, Galveston, N.W., 49 miles; 9th, Pike's Peak, N.W., 90 miles, Denver, N.W., 52 miles; 11th, Thatcher's Island, N.E., 70 miles, Eastport, E., 64 miles, Mt. Washington, N.E., 186 miles; 16th, Mare Island, Cal., S.E., 45 miles; 22d, Sandusky, N.W., 50 miles; 23d, Sandy Hook, N.W., 64 miles; 27th, Red Bluff, Cal., S.E., 44 miles; 28th, Mare Island, 46 miles; 31st, Sandy Hook, N.E., 76 miles, Cape Lookout, E.S.E., 120 miles, Toledo, W., 49 miles, Atlantic City, N.E., 64 miles, Barnegat, E., 72 miles.

VERIFICATIONS.

Indications.—The published tri-daily weather indications have been carefully compared with the reports of the succeeding 24 hours, with the following results: The general average percentage of verifications is 83.7, that of omissions to predict 0.3. The percentages by districts are: New England, 81.6; Middle Atlantic States, 84.7; South Atlantic States, 83.9; East Gulf States, 86.4; West Gulf States, 86.5; Tennessee and the Ohio valley, 83.8; Upper Mississippi valley, 82.0; Lower Missouri valley, 82.5; Upper Lake region, 80.9; Lower Lake region, 84.9; The percentages by elements are: Weather, 88.2; Wind, 82.1; Temperature, 82.1; Barometer, 82.6. Out of 3,720 cases there were 10 omissions; 132 failures; 124 one-fourth verified; 545 one-half verified; 422 three-fourths verified; 2,487 wholly verified.

Cautionary Signals.—There have been received reports as to the verification of 176 of the "cautionary" and "off-shore" signals that have been displayed during the month. Of these 111, or 63 per cent., were verified at the stations themselves, and about 121, or 69 per cent., within one hundred miles. Two of these orders were a few minutes late. Twenty-three cases are reported in which signals would have been justified if ordered, though in but few cases did the wind exceed 30 miles.

NAVIGATION.

Stages of Water in Rivers.—In the table on chart No. III are given the highest and lowest readings on the Signal Service gauges, from which it will be seen that at no time has the danger line been reached on any of the rivers there mentioned. The highest waters in the Mississippi occurred generally from the 1st to the 12th, and the lowest from the 12th to the 18th, and in the Ohio and tributaries, the highest from the 15th to the 18th, and the lowest from the 5th to the 13th.

Ice in Rivers is reported as follows: floating ice in the Arkansas at Shreveport on the 5th; Dakota river, 31st, froze over—ice 9 inches thick; Platte river froze over on the 4th; Mayuoketa river, Iowa, 6th, frozen over first time this season; James river, Dak., closed with ice 4 inches thick throughout the month. The Missouri frozen over on the 5th at Omaha, and has since remained closed; floating ice at Plattsmouth, 1st to 3rd, and at Leavenworth from the 5th to the 8th. The Mississippi froze over at St. Paul and La Crosse on the 4th, and navigation closed; at Dubuque, 7th ice gorged; 10th, broke up; 12th, ferries commenced running again; 23rd, main channel froze over; at Davenport floating ice was reported on the 4th and 5th; river gorged and ferries withdrawn on the 6th; icebroke up on the 7th, and floating ice continued in river until the 17th; 18th, channel clear; 23rd to 25th, floating ice; 26th, channel clear; 28th to 31st, floating ice; at Keokuk, floating ice from the 8th to 17th, and 23rd, 29th and 31st; at St. Louis, floating ice from 7th to 13th. The Monongahela, Alleghany and Upper Ohio rivers froze over on the 7th; broke up on the 10th; clear on the 12th; floating ice was reported at Cincinnati on the 7th, and on the 8th, navigation was nearly suspended; on the 9th, river clear; ice in Licking river seven inches thick. At Logansport, 4th, river frozen over one and half inch thick. Illinois river, 6th, frozen over solid. The Schuylkill river froze over on the 6th, but opened on the 11th. Floating ice was reported in the Delaware, at Philadelphia, 7th to 9th. The Connecticut river, at Newbury, frozen over, 8th to 30th. The Shetucket river frozen over, 7th to 28th—floating ice in the Thames, at New London, on the 28th. The Hudson was full of floating ice on the 4th, and froze over on the 7th, broke up from the 12th to the 26th. Otsego Lake, New York, 31st, partly open. Lake Champlain, 30th, thin ice, which broke up on the 31st. Wappinger's Lake frozen over on the 1st, and again on the 28th. Sebago Lake, 31st, ice in lower bay sixteen inches thick, upper bay and Lake open. New Bedford, Massachusetts, 6th, harbor frozen over; 9th, ice breaking up. The James river froze over at Richmond on the 7th. On the Lakes ice occurred as follows: Marquette harbor, 16th, ice formed; 17th, frozen over; 21st, clear. Escanaba, 4th and 10th, shore ice. Alpena, 5th, bay and river frozen over first time this season; 14th, clear; 16th, frozen over. On Lake Michigan navigation continued uninterrupted throughout the month. Detroit, 31st, floating ice in the river. Toledo, 3d, 6th to 21st, shore ice in river; 23d, river frozen. Buffalo, 7th, the river frozen over; some ice in harbor.

TEMPERATURE OF WATER.

In General.—The temperatures of water, as observed in rivers and harbors, are shown on the chart No. III. *Maximum and Minimum Temperatures.*—The highest maxima have been 70°4 at Key West; 64° at San Francisco; 60° at St. Marks and 59° at Jacksonville and Galveston. The lowest minima have

* On the Western Plains storms of wind, with driving snow, are popularly styled "blizzards."

been: 29° at Pittsburg; 29°5 at Portland, Me., and Norfolk; 30° at New York, and 31° at Louisville and Keokuk. At Alpena, Buffalo, Chicago, Cleveland, Escanaba, La Crosse, Marquette, Omaha, St. Paul, Toledo and Yankton the observations have been interrupted by ice.

Ranges of Temperature.—The least have been 3° at Grand Haven and New London; 4° at Wood's Holl, Wilmington, Duluth; and 5° at Sandusky, Eastport and Charleston. The largest, 14° at Nashville, 12° at Augusta, Galveston, Memphis, San Francisco and Norfolk.

ATMOSPHERIC ELECTRICITY.

Thunder-storms were of rare occurrence. They are reported as follows: 12th, Fla., La., Tex.; 13th, Del., N. C., Va.; 17th, Kan.; 18th, Tex.; 19th, Fla., La., Miss., Ala.; 20th, Ohio; 21st, N. C.; 22nd, Cal.; 25th, Col., La.; 26th, Ark., Kan., Ind. Ter.; 27th, Ill., N. C., Ohio, Va., Ga.; 28th, S. C.; 29th, La., Miss.; 30th, Ga., Ala. An interesting series of thunder-storms was reported by Prof. Nipher of the Missouri Weather Service, as occurring in Missouri, see the account of low barometer No. XI At Visalia on the 16th a severe sand and rain storm with intense electricity occurred, and the telegraph line to Modesta, 133 miles north, was worked without battery.

Distant Lightning was reported as follows: 9th, Ga.; 12th, Miss.; 13th, Ga., N. C.; 16th, Cal., Kan.; 17th, Kan.; 19th, Miss.; 20th, Fla.; 21st, Va.; 22d, Cal.; 26th, Kan.; 27th, Ga., N. C.

Auroras.—1st, Mass.; 3d, Ohio; 17th, Iowa, La.; 22d, N. Y.; 23d, Neb., Minn, Iowa, N. Y., Ohio, W. Va., N. J., Pa., Mass., Conn., Me., R. I., Vt., Md., Mich., N. H., Dak.; 24th, Iowa, Me., Mo., Wis.; 25th, Neb.; 30th, Iowa, N. C.

Magnetic Phenomena.—The average diurnal magnetic range in declinations is reported by Prof. Hinrichs, of Iowa City, as 4½ minutes.

OPTICAL PHENOMENA.

Solar Halos.—1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th and 31st.

Lunar Halos.—5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th and 30th.

Mirage.—Great Bend, Kan., 14th, 17th; New Bedford, Mass., 17th, 29th; Moorhead, Min., 2nd, 21st, 28th; Genoa, Neb., 14th, 15th; Galveston, 4th; Smithville, N. C., 7th; Savannah, 18th; Tybee Island, 5th, 6th, 11th, 12th; New London, 1st, 2nd, 3rd, 8th, 16th, 24th; 30th. At Key West, Fla., on the 12th, an optical phenomenon occurred, caused by the sun's rays falling obliquely upon a stratum of condensed vapor resting upon the surface of the ocean, the temperature of the water being about 15° below that of the air; the surface of the sea appeared raised to the upper surface of this stratum, the vessels in the harbor seeming to sink, their hulls gradually disappearing while their masts and rigging stood out in bold relief.

MISCELLANEOUS PHENOMENA.

BOTANICAL.—Okahumpka, Fla., 5th, roses blooming; Monticello, Iowa, 1st, pansies blooming; Independence, Kan., wheat growing rapidly since the 15th; Great Bend, Kan., 31st, wheat looking fine; Kinsley, Kan., wheat growing throughout month; Owing Mills, Md., lilacs budding; Fayette, Miss., 8th, daises blooming; 20th, daffodils in bloom; 30th, peach and plum trees blooming; Kensico, N. Y., 28th, transplanting seedlings; Ringgold, Ohio, 31st, wheat very green; McMinnville, Tenn., violets blooming all winter; 18th, hyacinths in bloom; Clarksville, Tex.; 31st, wheat looks well, some cotton yet unpicked; Visalia, Cal., 31st, grain and grass growing luxuriantly, almond trees in bloom; Nashville, 29th, lilac buds swelling, sap rising in rose bushes; Louisiana, Mo., 28th, fruit buds of apples, peach and apricots were pronounced safe and very abundant. The volunteer observer at Brookhaven, Miss., reports the following botanical notes: 18th, hyacinths in bloom; 20th, strawberries in bloom; 25th, narcissus in bloom; 26th, pansies in bloom and spirea budding; 27th, jonquils in bloom, woodbine leafing and lilac budding; 28th, dogwood and peach buds swelling. Communication from Mr. A. Story, Salem, Mass., states that in that portion of the State nothing is more common than to find dandelions in bloom in mild winter weather, and the trailing arbutus was possibly in bloom in December, but that apple, rose, cherry and lilac were not in bloom out of doors in Fitchburg during December, as is stated in the WEATHER REVIEW for that month.

BIRDS.—*Blackbirds* were seen at Judsonia, Ark., 28th. *Bluebirds*, Southington, Conn., 12th, 20th to 28th; Baxter Springs, Kan., 17th, 18th. *Geese* flying N., Carbondale, Ill., 5th; Fort Madison, Iowa, 16th; Baxter Springs, Kan., 27th; Emerson, Neb., 31st; Urbana, Ohio, 17th, 18th; flying W., Carbondale, Ill., 30th; Fort Madison, Iowa, 22nd; flying NW., Visalia, Cal., 10th; flying S., Cresswell, Kan., 30th; Boise City, Idaho, 28th; Vineland, N. J., 19th; Bellefontaine, Ohio, 18th; seen at Omaha, Neb., 18th; Clear Creek, Neb., numerous throughout the month; Corning, Mo., every day throughout the month. *Crows*, Judsonia, Ark., 8th; Pike's Peak, on summit, 6th. *Bluejays*, Judsonia, Ark., 17th; Monticello, Iowa, 30th;