a hundred miles of the stations. Thirty were not justified. Seventy-four cases are reported in which signals were needed but not displayed.

NAVIGATION.

Height of rivers.—The highest and lowest readings on the Signal Service river-gauges are given in the table on chart No. III. From which it appears that the Red river at Shreveport and the Miss. from Cairo to New Orleans were highest during the first ten days of the month and lowest at its close. At Cairo the lowest reading of the month was on the 30th, when the river was only three inches above the low watermark of December, 1861. In the Ohio and tributaries the lowest waters occurred about the middle of the month.

Ice in rivers is reported as follows: *Mississippi river*—Davenport, closed 2nd, men crossed 4th, teams 10th. St. Louis, navigation interrupted 2d, river gorged 4th, navigation resumed 7th, suspended 9th, river frozen over 11th. Cairo, navigation suspended to points above on the 2nd, and to points below 23d. Keokuk, closed 16th. Nashville, ice in river 19th, 20th, 30th and 31st. Memphis, river gorged 30th. La Crosse, ice averages 19 inches in thickness, and some was cut 31 inches thick, on the 31st. *Missouri river*—At Lower Brule Agency, closed 1st. Leavenworth, frozen at shore during month, and after the 20th channel closed. Plattsmouth, Neb., closed 3d. St. Joseph, Mo., ice bridge 5th. *Ohio river*—Cincinnati, navigation closed 9th, and river frozen over 10th. Laconia, Ind., full of floating ice 9th. Louisville., Kentucky, navigation suspended 9th, river gorged 15th. Pittsburg, frozen over 10th. Portsmouth, Ohio, gorged 10th.

For other places the following notes have been received: On the 1st, Albany, N. Y., Erie canal closed; Lyndon, Ill., Rock river closed; Logansport, Ind., Wabash and Eel rivers frozen over; Alpena, Mich., Thunder Bay river frozen over (and harbor frozen 8th); Chicago, Ill., navigation closed. 2nd, Monticello, Iowa, Maynoketa river frozen over; Trenton, N. J., Delaware and Raritan canal frozen over; Cincinnati, Miami canal closed. 3rd, Shelburne, N. H., Androscoggin crossed by pedestrians (and on 10th by teams). 4th, Trenton, N. J., Delaware river frozen over. 5th, New Geneva, Pa., on account of ice boats stopped running. 6th, Buffalo, N. Y., navigation closed. 8th, Decatur, Ill., Sangamon river frozen over. 9th, Philadelphia, Pa., Schuylkill and Delaware rivers frozen over (ice gorges in Delaware 17th and 27th); Morgantown, W. Va., Monongahela river frozen over; Knoxville, Tenn., Holston river closed 9th (first time in thirteen years). 10th, Bloomfield, Wis., Geneva lake frozen over; Bangor, Me. and Erie, Pa., navigation closed. 12th, Washington, D. C., Potomac closed. 15th, Salem, N. J., Salem creek closed (ice 10 in. thick 31st); Detroit, Mich., navigation closed (ice in river 4th to 12th, gorged 12th). 16th, Grand Haven, Mich., navigation closed. 17th, Cooperstown, N. Y., Otsego lake closed; Port Huron, Mich., Black river frozen, and an ice bridge across the St. Clair. 18th, Asheville, N. C., the French Broad river was crossed on ice by cattle, &c., for several days about this date. This is the first time that this has ever occurred within the knowledge of the observer. 19th, Fall River, Mass., Taunton river and Narragansett bay frozen over. 20th, West Point, N. Y., large masses of floating ice; Wappinger's Falls, N. Y., navigation on Hudson ceased. 25th, Standish, Me., Sebago lake frozen; has not been known to freeze *with the water so low* since 1838.

TEMPERATURE OF WATER.

The maximum and minimum temperatures at the bottom of the water are given in the table on chart No. II. The highest maxima are: Charleston, 53°; Jacksonville, 54°; Mobile, 55°; St. Marks, 50°; Punta Rossa, 72°; Key West, 84°, which unusually high temperature was observed on the 24th. The lowest maxima are: 32°, Omaha; 33°, St. Louis and Milwaukee; 34°, Grand Haven and Marquette, 36°, Chicago, Duluth and Knoxville.

Minimum water temperatures.—The lowest are: 28°, New York; 29°, Escanaba; 30°, Portland, Me., Wood's Hole; 31°, Baltimore and Memphis. The highest minima are: 54°, St. Marks; 52°, Punta Rossa; 45°, Key West, Jacksonville and Mobile; 43°, Charleston; 41°, Savannah.

Ranges of water temperatures.—The largest ranges of water temperature during the month are the following: Key West, 39°; Punta Rossa and Baltimore, 14°; Springfield, Norfolk and Wilmington, 11°; Augusta, Charleston, Mobile, New York and New London, 10°. Smallest ranges: Omaha, 0°; St. Louis, 1°; Knoxville and Duluth, 3°; Keokuk and San Francisco, 4°.

Ocean temperatures.—December 28th, bark Speranza, in lat. 38° 19′ N., 71° 10′ W., found the temperature of the water 68°, after two hours, 75°, and one hour subsequently 76°. All at once found the water riffling with a very heavy swell, and supposed it to be the boundary of the Gulf stream, as six miles in a NW. direction found the water only 55°.

ATMOSPHERIC ELECTRICITY.

Thunder and lightning-storms have occurred as follows: 8th and 9th, New London, Conn. 17th, Galveston, Texas; Pt. Pleasant, La. 18th, Newport, R. I.; New London and Mystic, Conn.; Dover, Del.; New Orleans, La.; Mendon, Billerica, Westboro', Fall River, Waltham and Boston, Mass.; Brookhaven, Miss.; Vineland, N. J. 28th, Galveston, Texas; Wilsonville, Ala. 31st, Indianola and Austin, Texas.

Auroras were observed as follows: 4th, Yankton, Dak. 10th, Boston, Quincy, and Somerset, Mass.