

ceding section; like No. XI, it was formed by the isolation, as it may be called, of the southwestern end of that belt, and passed northeastward from Arkansas to New York, where it was central on the 25th, being attended with southwesterly gales on the South and Middle Atlantic coasts. On the 26th, in the afternoon, it was apparently central near Cape Roziere.

No. XIII. On the morning of the 25th, high barometer No. 11 extended over Texas; thence to Nebraska southerly winds prevailed during the day, with falling barometer, while to the northward cold northerly winds prevailed over Dakota and Minnesota: thus in the afternoon at Omaha and North Platte the temperatures were respectively  $37^{\circ}$  and  $44^{\circ}$ , while at Yankton  $8^{\circ}$  was reported. The area of falling barometer and temperature contrasts, moved slowly south and east, and on the morning of the 26th stretched from Kansas to Lake Erie; southerly winds and higher temperatures prevailing at Leavenworth, Keokuk, Chicago, Indianapolis, Cincinnati and Cleveland, while cold northerly winds prevailed at the stations immediately north of these. The belt of depression was even more strongly marked on the afternoon of the 26th, when it extended from Indian Territory to New York, the isotherms for  $20^{\circ}$  and  $40^{\circ}$  were parallel to each other over the greater part of this belt at a distance of 50 to 150 miles. The western end of this barometric trough being closed up by the rapid advance southward of high barometer No. 12, there was left, principally, an area of low pressure which was in West Virginia at midnight on the 26th, and was central over Chesapeake Bay on the morning of the 27th. Snow prevailed during that day over the Middle and Eastern States, while the depression moved eastward to a considerable distance from the Atlantic coast; it seems probable that during the rest of the 27th the depression must have turned northeastward, unless the well-marked storm-centre over southern Nova Scotia at midnight of 27th originated in the heavy snow-fall that prevailed in that region.

No. XIV. High barometer No. 12 appears central on the afternoon of the 27th over the upper Mississippi valley, and falling barometer, with southeast winds, prevailed in Kansas and Nebraska. This, by the afternoon of the 28th, had developed into a well marked area of low barometer, central between Omaha and Leavenworth, which was drawn southward into Missouri and then developed into an extensive storm, whose history belongs to the following month.

## ATMOSPHERIC TEMPERATURE.

The general distribution of temperature during the month, is shown by the isothermal lines on chart No. II, from which it will be seen that an average of  $-5^{\circ}$  or less is recorded for the greater part of Minnesota and the northwestern half of Dakota. On comparing the temperatures for the current month with those of February, 1856, the latter year, which was unusually cold, appears warmer by at least  $5^{\circ}$  throughout Illinois and Michigan; and by  $10^{\circ}$  throughout Missouri and Iowa; and by  $15^{\circ}$  or  $20^{\circ}$  in Minnesota; but was colder by from  $5^{\circ}$  to  $10^{\circ}$  throughout the Middle and Eastern States.

As an indication of the continued severity of the cold, the following figures are reported, showing the depth, in inches, to which the ground has been frozen: Conn., 46; Ga., 6; Ill., 48 to 72; Ind., 32; Iowa, 54; Md., 20 to 30; Mass., 36; Mich., 60; Mo., 12 and 14, 18 and 38; Neb., 48, 48, 30 to 40; N. H., 60; N. J., 60, 42, 28 and 36; N. Y., 36, 96, 22; Ohio, 28, 36, 22, 24, 28, 36 to 66, 42; Penn., 26, 18 to 24, 30; R. I., 48; Va., 8, 13.

(1.) *Range of temperature.*—The monthly range of temperature has been largest and most variable in the Middle and Eastern States, having amounted to from  $46^{\circ}$  to  $90^{\circ}$ ,

according to the location of the station. In the Gulf States it has varied from 37° to 62°, and at Key West was 27°. For Minnesota, ranges from 44° to 60° are reported. At San Francisco the range was 23°.

(2.) *Unusually low temperatures.*—Temperatures of —35° or less have been reported as follows:—SIGNAL SERVICE STATIONS: Mt. Washington, 35°; Pembina, 41°, 39°, 44°, 40°, 35°; Duluth, 35°. CANADIAN STATIONS: Fort Garry, 36°, 35°, 38°, 35°, 36°, 36°, 37°, 35° on as many different days. VOLUNTEER OBSERVERS: Oxford, Me., 34; Traverse City, Mich., 37; Hutchinson, Minn., 36; Woodstock, Vt., 30; Wien, Wis., 42; Embarrass, Wis., 48, mercury froze on the 9th and 12th; Beloit, Wis., 36.

## PRECIPITATION.

The distribution of rain-fall (or melted snow) is given on Chart No. III as closely as possible, considering the unequal distribution and the limited number of returns, there being but about 500 rain-gauges to an area east of the Rocky Mountains of 20° in latitude by 40° in longitude. The precipitation has, of course, throughout the States north of the 35th parallel, taken the form of snow, and as many volunteer observers give the depth of the snow in inches without melting and measuring to ascertain the corresponding amount of water, it has been necessary in some cases to convert the recorded snowfall into water by multiplying by an empirical factor, for which one-tenth has been generally adopted in this country.

(1) *Depth of Snow.*—The total depth of snow fallen during the month, as recorded mostly by volunteer observers, is as follows in inches: Me., 6 to 18; N. H., 6 to 15; Vt., 13 to 15; Mass., 4 to 31; Conn., 8; N. Y., 3 to 42; N. J., 5 to 8; Penn., 5 to 30; Md., 3 to 13; Va., 1 to 11; Ohio, 2 to 15; Ky., 2 to 5; Tenn., 3; Ind., 2 to 16; Mich., 11 to 50; Ill., 6 to 13; Wis., 6 to 32; Mo., 3 to 9; Iowa, 5 to 18; Minn., 7 to 16; Kan., 1 to 9; Neb., 4 to 20.

(2) *Special Rains.*—The excess of rainfall in Tennessee, as shown on Map No. III, is due especially to the heavy rain attending storm No. XII, which prevailed during the 23d, 24th and 25th, in consequence of which a severe flood prevailed in the Holston river and the upper portions of the Cumberland and Tennessee rivers.

(3) *Draughts.*—In consequence of the deficient rainfall in the northern portion of the country throughout the preceding six months and the deeply-frozen ground, reports of failing wells or general deficiency of water have been received from Missouri, New Hampshire, New Jersey, New York, Pennsylvania and Connecticut. From similar causes the rivers have been somewhat lower than usual.

(4) *Rainy Days.*—The average number of days on which some rain or snow fell has been as follows, according to the locations: New England, from 5 to 15; Middle States, 4 to 12; South Atlantic States, 6 to 10; Eastern Gulf States, Ohio valley and Tenn., 9 to 12; Southwest, except 2 in western Texas, 9 to 14; southern shore of Lake Erie, 13 to 17; southern shore of Lake Ontario, 17 to 23; Mich., 11 to 22; Wis., 9 to 13; Iowa, 4 to 12; Minn., 2 to 12; Neb., 1 to 16; Kan., 1 to 10.

## HUMIDITY.

The average relative humidity for the month, as reported from the Signal Service stations only, has been very uniform, and varies from 65 to 75, except at a few localities on the Lower Lakes, the Texas coast and the extreme Northwest, where averages of 80 or 85 are reported. Owing to the very low temperature that has prevailed in the latter section the observations are somewhat uncertain.