

Colorado, Kansas, Maine, Nebraska, and Utah. 19th, Illinois, Iowa, Minnesota, Montana, Nebraska, and Wisconsin. 20th, Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, Pennsylvania, South Dakota, Vermont, and Wisconsin.

21st, Illinois, Indiana, Iowa, Maine, Massachusetts, Michigan, Missouri, New Hampshire, North Dakota, Ohio, Tennessee, Vermont, and Wisconsin. 22d, Indiana, Iowa, Massachusetts, Michigan, New York, Ohio, Vermont, and West

Virginia. 23d, Colorado, Montana, New York, and Ohio. 24th, Minnesota and Nevada. 25th, Colorado, Maine, Nebraska, Nevada, North Dakota, South Dakota, Vermont, and Wisconsin. 26th, Colorado, Iowa, Michigan, Minnesota, Montana, Nebraska, South Dakota, Utah, and Wisconsin. 27th, Michigan, Minnesota, and Wisconsin. 28th, Iowa, Maine, Michigan, Nevada, Utah, and Wisconsin. 29th, Colorado, Iowa, Kansas, Nebraska, Utah, and Wisconsin. 30th, Colorado, Indiana, Iowa, Kansas, Minnesota, Nebraska, and Wisconsin.

WINDS.

The prevailing winds in April, 1893, are shown on Chart II by arrows flying with the wind. In New England, on the northeast slope of the Rocky Mountains, over the southern plateau region, and along the middle Pacific coast the winds were generally from southwest to northwest; in the middle Atlantic states, the Ohio Valley and Tennessee, and over the middle and northern plateau regions, from southeast to southwest; in the south Atlantic and east Gulf states, on the southeast slope of the Rocky Mountains, and along the north Pacific coast, from south to west; over the Florida Peninsula and in the west Gulf states, from east to south; in the upper lake region, from northeast to southeast; in the extreme northwest, from northwest to north; in the Missouri Valley, from northwest to northeast; along the south Pacific coast, from west to northwest; and in the lower lake region, the upper Mississippi valley, and on the middle-eastern slope of the Rocky Mountains, variable.

HIGH WINDS (in miles per hour).

Wind velocities of 50 miles, or more, per hour were reported at regular stations of the Weather Bureau as follows: 2d, 56, sw., at Winnemucca, Nev. 3d, 72, s., at Fort Canby, Wash. 4th, 50, sw., at Detroit, Mich. 5th, 50, sw., at Winnemucca, Nev. 6th, 60, sw., at Salt Lake City, Utah; 58, sw., at Amarillo, Tex., Colorado Springs, Colo., and Winnemucca, Nev.; 52, sw., at Pueblo, Colo.; 51, sw., at Dodge City, Kans.; 50, w., at Fort Stanton, N. Mex.; 50, se., at Keeler, Cal. 7th, 63, sw., at Rapid City, S. Dak.; 60, w., at Pierre, S. Dak.; 60, nw., at Huron, S. Dak.; 59, se., at Erie, Pa.; 54, sw., at Lexington, Ky., and Amarillo, Tex.; 54, w., at North Platte, Nebr.; 52, sw., at Detroit, Mich.; 52, w., at Valentine, Nebr.; 50, w., at Cheyenne, Wyo.

11th, 66, w., at Amarillo, Tex.; 60, sw., at Hannibal, Mo.; 58, sw., at Dodge City, Kans.; 56, nw., at Kearney, Nebr.; 53, sw., at Wichita, Kans.; 52, nw., at Colorado Springs, Colo.; 50, nw., at El Paso, Tex. 12th, 58, se., at Chicago, Ill.; 54, sw., at Saint Louis, Mo.; 54, w., at Huron, S. Dak.; 52, sw., at Detroit, Mich., and Hannibal, Mo.; 50, sw., at Davenport, Iowa, and Red Wing, Minn.; 50, n., at Saint Vincent, Minn. 13th, 68, s., at Fort Canby, Wash.; 60, sw., at Detroit and Port Huron, Mich. 14th, 54, nw., at Galveston, Tex. 18th, 50, n., at Amarillo, Tex. 19th, 62, e., at Chicago, Ill.; 60, n., at Amarillo, Tex., and Kearney, Nebr.; 53, n., at Wichita, Kans.; 50, n., at Dodge City, Kans.

20th, 72, ne., at Detroit, Mich., and Chicago, Ill.; 66, s., at Charleston, S. C.; 60, se., at Block Island, R. I., and Sault Ste. Marie, Mich.; 60, w., at Lexington, Ky.; 57, w., at Pensacola, Fla.; 56, nw., at Kearney, Nebr.; 54, se., at Oswego, N. Y.; 54, nw., at Sioux City, Iowa; 53, s., at Fort Canby, Wash.; 52, se., at Erie, Pa.; 52, sw., at Port Huron, Mich.; 52, w., at Saint Louis, Mo.; 51, w., at Columbus, Ohio; 50, se., at Cleveland, Ohio; 50, ne., at Cheboygan, Mich.; 50, nw., at Leavenworth, Kans., Springfield, Mo., and Huron, S. Dak. 21st, 60, se., at Block Island, R. I.; 54, sw., at Nantucket, Mass.; 50, sw., at Chicago, Ill. 22d, 50, s., at Fort

Canby, Wash. 23d, 56, se., at Huron, S. Dak. 24th, 51, n., at Colorado Springs, Colo. 26th, 54, se., at Erie, Pa.; 52, sw., at Chicago, Ill. 27th, 54, sw., at Chicago, Ill. 30th, 53, ne., at Chicago, Ill.

LOCAL STORMS.

(75th meridian time is used at regular Weather Bureau stations.)

3d.—Near Fall Creek, Pittsylvania County, Va., 2 boys were killed by lightning. At Parkersburg, W. Va., a thunderstorm, with high southwest wind, occurred about 11 p. m., causing damage of a minor character. A destructive thunderstorm was reported at Berrien Springs, Mich. At Grand Haven, Mich., a heavy thunderstorm began in the early morning and continued until 10 a. m.; a flagstaff was struck by lightning. A thunder, rain, and hail storm moved northeast over Powhattan, Kans., about 4 p. m. In the afternoon a westerly gale caused some damage about Fort Buford, N. Dak.

4th.—A house was struck by lightning at Portland, Me. High wind the night of the 4-5th caused some damage at Albany, N. Y. Westerly gales interrupted traffic on the Straits at Sault Ste. Marie, Mich., and caused considerable damage to telegraph lines, etc. Damage by lightning was reported at Benzonia, Mich.

5th.—In the afternoon at Knoxville, Tenn., a house was struck and a boy killed by lightning.

6th.—At Chicago, Ill., a temporary hotel, valued at \$5,000, located near the World's Columbian Exposition, was blown down. The night of the 6th a thunderstorm caused considerable damage at North Marshall, Mich. Severe thunderstorms occurred in Jefferson, Racine, and Waukesha counties, Wis. In the afternoon a house in Saint Paul, Minn., was struck by lightning. At Denver Colo., a heavy windstorm prevailed in the afternoon and evening; telegraph lines were blown down, and one person was killed by a falling cornice. A southwest gale prevailed at Salt Lake City, Utah, and about 1.20 p. m. the wind reached a velocity of 60 miles per hour, the highest velocity on record at that station. Rain fell from 11.15 to 11.25 a. m. At 2.20 p. m. rain began and changed to snow, and snow ended 4 p. m. From 10 a. m. to 12.30 p. m. the temperature fell from 62° to 34°. Several persons were injured, and the damage to buildings was estimated at \$2,000.

7th.—A thunderstorm, with light rain, moved east of north over Westfield, N. Y., between 5 and 6 a. m., damaging out-buildings, roofs, etc., to the extent of about \$3,000. A storm of rain and sleet, changing to snow, began at Ithaca, N. Y., at 6 a. m. A thunderstorm, with heavy rain and high wind, moved northward over Jamestown, N. Y., at 7 a. m. A thunder, rain, and hail storm moving east was reported at Falconer, N. Y., at 7.15 a. m. At Springville, N. Y., a thunderstorm moved north at 7.30 a. m.; a barn was wrecked, killing one person and 4 head of cattle. A southerly gale prevailed at Dunkirk, N. Y., from 7 to 9 a. m. At Fredonia, N. Y., a light thunderstorm, moving north with heavy rain, began 6.30

p. m., 7th, and high winds continued until the morning of the 8th. Three thunderstorms, with rain and hail, visited Number Four, N. Y. At Erie, Pa., a thunderstorm moved east-northeast in the early morning, and a heavy southeast gale caused damage of a minor character to the extent of about \$5,000.

At Riley, Ill., hail and a heavy gust of wind from the southwest occurred at 3.30 p. m. A Romeoville, Ill., a destructive storm, with rain and hail, moved northeast in a path about 40 rods in width at 5.45 p. m.; 9 persons were reported killed and the destruction to property was placed at \$26,000. At 7 p. m. a thunder, rain, and hail storm moved east-northeast over Chicago, Ill., in a path about one mile in width; the damage to glass, by hail, was placed at \$100,000. During the day several structures near the World's Fair grounds were demolished by wind; loss about \$30,000. A thunderstorm, with rain and hail, moved north of east 3 miles south of South Haven, Mich., at 1.30 a. m. A number of persons were injured, and property was destroyed to the value of \$10,000 to \$20,000.

A heavy thunder and rain storm moved northeast over Lacota, Mich., at 3 a. m., damaging buildings to the extent of about \$25,000. At Detroit, Mich., a heavy thunderstorm, with some hail, occurred in the early morning. A second thunderstorm, with hail and heavy gusts of wind, began at night and continued until the early morning of the 8th; considerable damage by high wind was reported throughout the state. A heavy westerly gale prevailed over South Dakota. At Rapid City the wind reached a velocity of 63 miles per hour from the southwest, and the damage to buildings was placed at \$2,500. At Pierre, a velocity of 60 miles per hour was reached in the afternoon.

8th.—Severe thunderstorms occurred in New England in the afternoon and at night. At Solon, Me., a house was struck by lightning and burned. At Bethel, Me., the storm was attended by hail and flakes of heavy ice, and a stable was struck and a horse killed by lightning. At Fryeburg, Me., a railroad station was struck by lightning and burned. At North Conway, N. H., a thunder and hail storm began at midnight and continued until the morning of the 9th. Near Middleboro, Mass., a house was struck by lightning. In the late afternoon a thunderstorm moved east over Boston, Mass.

9th.—A heavy hailstorm prevailed at Oklahoma City, Okla., from 9 to 9.10 a. m.; some of the hailstones were as large as walnuts, and caused some damage to fruit trees.

10th.—A severe thunder, rain, and hail storm moved north of east over Albany, Tex., between 7 and 8 p. m.

11th.—Destructive local storms occurred throughout the Western States. From 11 p. m. to midnight a heavy rain and thunderstorm, with light hail, moved east over Centralia, Ill. At Springfield, Ill., a thunder and rain storm began in the evening and increased in intensity, with hail, after midnight. At Vandalia, Ill., a thunderstorm moved northeast about midnight, destroying property to the estimated value of \$12,000. A thunderstorm, with hail at intervals, occurred at Minneapolis, Minn., in the evening. At Granite Falls, Minn., a man was killed by lightning. At Bismarck, N. Dak., heavy snow and a severe northerly gale began in the evening and continued during the 12th; trains were delayed by drifted snow. The storm was one of the severest of the season over a great part of North Dakota. A heavy rain and hail storm was reported at Canton, S. Dak., about 3 p. m.

At Sioux City, Iowa, a heavy thunderstorm continued from 6 to 7 a. m., and high wind prevailed in the early morning. In the afternoon a heavy fall of hail was reported 5 miles southeast of Sioux City. At Akron, Iowa, the damage to buildings by wind was placed at \$50,000. A tornado moving east was reported near Westfield, Ohio, at 3.30 p. m. About 6 p. m. a tornado moved northeast in a path 300 yards in

width about 3 miles east of Fonda, Iowa, with heavy rain and some hail. A child was killed, and a number of small buildings valued at \$6,000 were destroyed. A tornado moving east of north in a path 100 yards in width was reported at Newton, Iowa, at 8 p. m. The storm had a whirling motion from right to left, and was preceded by rain and hail. Several persons were injured, and the value of property destroyed was placed at \$10,000. At Davenport, Iowa, a thunder and rain storm continued during the evening; the damage by rain was estimated at \$20,000.

Exceptionally severe storms occurred throughout central and northern Missouri in the evening. At Steeleville a heavy thunder, rain, and hail storm moving northeast prevailed from 6 to 6.45 p. m., and a second thunderstorm occurred at that place about 11 p. m. About 6.15 p. m. a thunderstorm moved northeast at Rolla, Mo., damaging frail buildings to the extent of \$2,000. About 7.30 p. m. a tornado appeared about $\frac{1}{4}$ mile northeast of Mayview, Lafayette County, Mo., and moved in an irregular northeasterly course about 12 miles, destroying buildings in its path. The storm cloud presented a black funnel-shaped mass, with the point down; the crest of the cloud appeared to be ablaze, and the path of destruction varied in width from 70 feet to 500 yards. The tornado passed about 6 miles southeast of Lexington, Mo., in a path 20 feet to 300 yards in width. At that point the tornado was attended by a continuous roar of thunder and a constant glare of lightning, and had a whirling motion from right to left. Trees on the north side of the center of the track fell east, southeast, and south, those on the south side fell north and northeast, and in the center they lay with the course of the storm. The storm passed near Page about 7.15 p. m., in a path about $\frac{1}{4}$ mile in width, with thunder and lightning, rain, and hail near the path. A heavy thunderstorm was reported at Dover at 7.30 p. m. The loss of life in Lafayette County, Mo., by this tornado was placed at 6; a number of persons were injured; and 15 buildings, valued at \$10,000, were destroyed.

At 6.30 p. m. a tornado moved northeast 6 miles northwest of Salem, Dent County, Mo., with thunder and lightning and heavy rain, killing 10 persons, and destroying buildings valued at \$20,000. A heavy rainstorm, with lightning and a northeast gale, visited Mexico, Audrian County, Mo., about 9 p. m.; in the county the damage was placed at \$3,000. A thunderstorm, with heavy rain, moved eastward over Washington, Mo., between 10 and 11 p. m. At Saint Louis, Mo., lightning was observed in the northwest and southwest at 6.50 p. m., and increased in frequency and intensity until 7.55 p. m., when thunder was heard and heavy rain began to fall, with hail from 9.15 to 9.30 p. m. About midnight the wind increased to a gale from the southeast. At 1 a. m. a heavy, dark cloud was observed approaching from the southwest, and passed directly over the city, with torrents of rain, and wind 54 miles per hour from the southwest. The pressure oscillated .20 inch, as shown by the barograph record, apparently first increasing .15 and then decreasing .20 inch from the highest point. The storm was exceptionally sudden and severe and caused considerable damage in and about the city and on the river.

At Hannibal, Mo., the wind was brisk from the south during the day. At 9.30 p. m. the wind increased to 30 miles per hour, and at 11.33 p. m. reached 60 miles per hour from the southwest, and maintained that velocity for 5 minutes, with heavy thunder and vivid lightning. Considerable damage of a minor character was caused in and about the city. A heavy thunderstorm, with small hail, visited Hartington, Nebr. Between 3 and 4 p. m. a thunderstorm, with heavy rain and hail, moved northeast over Little, Nebr., killing some stock and damaging property to the extent of \$2,000. Near Stafford, Nebr., several persons were injured and a num-

ber of buildings were destroyed. At Cedar Creek, Nebr., a thunder, rain, and hail storm moved northeast at 3.45 p. m., damaging property to the estimated value of \$5,000. A heavy thunder and hail storm, with light rain, moved northeast near Inman, Nebr., at 3.45 p. m., seriously injuring one person and blowing down 19 small buildings. Frail buildings were destroyed near Ponca, Nebr., by a thunderstorm.

A hailstorm moved north at Plainview, Nebr., at 4 p. m. A destructive storm passed across the southeast part of Holt County, Nebr., about 4 p. m., injuring a number of persons and destroying farm buildings. At Omaha, Nebr., a thunderstorm, with rain and hail, occurred in the early morning. At 5.49 p. m. a severe thunderstorm, with heavy rain and hail, caused considerable damage of a minor character. About 2.30 p. m. a heavy rain and hail storm, with thunder and lightning, moved northeast near Beaumont, Kans., destroying several barns. In the afternoon a man was killed by lightning at Robinson, Kans. A violent thunder, rain, and hail storm visited Muscotah, Kans., at 4.15 p. m., injuring several persons, and destroying property valued at \$10,000. At Everest, Kans., a thunderstorm, with rain and hail, moved northeast at 4 p. m.; one person was killed near Everest, and some damage was caused by hail. During a thunderstorm which visited Altoona, Kans., about 5 p. m. hail the size of walnuts fell. At 5.30 p. m. a tornado, with thunder, lightning, and hail, moved northeast over Parker, Kans., in a path 300 to 400 feet in width, destroying property to the extent of \$100,000.

A hailstorm, with high wind, destroyed outbuildings at Parsons, Kans., at 6.25 p. m. Damage by high wind was reported at Concordia, Kans. A wind, rain, hail, and thunder storm began at Keesees Ferry, Ark., at 10 p. m. At 7 p. m. a thunder, rain, and hail storm moved east over Paris, Tex., damaging property to the value of \$10,000. A rain and hail storm visited Petty, Tex., at 7 p. m., injuring 3 persons and damaging property. Considerable damage was caused by hail near Albany, Tex., between 7 and 8 p. m. A heavy thunder and hail storm moved southeast over Brookston, Tex., at 7.30 p. m. A rain, hail, and thunder storm moved eastward over Oak Cliff, Tex., at 9 p. m., destroying property valued at \$10,000. High wind caused considerable damage about Dallas, Tex. At 9.10 p. m. a severe thunderstorm, with hail and heavy rain, moved east over Dallas in a path 100 to 150 feet in width, uprooting trees and unroofing houses. A thunderstorm moved northeast over Mount Vernon, Tex., at 11 p. m., causing damage of a minor character.

12th.—Severe local storms occurred in the Ohio and Mississippi valleys and the upper lake region. A thunder, rain, and hail storm moved northeast over Vian, Ind. T., at 6.30 p. m. A rain and hail storm moved northeast 4 miles south of Newellton, La., at 4 p. m., killing one person, injuring several, and destroying property valued at \$10,000. A thunderstorm, with hail and heavy rain, moved northeast over Water Proof, La., about 4.15 p. m., causing damage in a path 400 feet in width. A violent thunder, rain, and hail storm moved northeast over Baldwin, Miss., at 12.30 a. m., killing one person and destroying property to the extent of \$15,000. A thunder and hail storm moved east over Robinsonville, Miss., at 4.30 p. m., killing 12 persons and destroying property to the extent of \$25,000. Considerable damage to buildings was caused by a thunder, rain, and hail storm which passed northeast over Lewisburg, Miss., at 4.30 p. m.

A severe thunderstorm, with heavy rain and hail, moved southeast over Corinth, Miss., about 7 p. m., causing considerable damage of a minor character. A violent thunder, rain, and hail storm visited Sheffield, Ala., at 9 p. m. A heavy thunderstorm, with rain and hail, passed northeast over Brownsville, Tenn., about 4 p. m.; timber was blown down, and several persons were injured by a falling house. Trees

and houses were prostrated by a thunderstorm that moved eastward over Jackson, Miss., at 4.30 p. m. Some damage was caused by hail at Covington, Tenn. Heavy rain, hail, and thunder storms were noted at Watertown, S. Dak., in the afternoon and evening. Westerly gales prevailed in the upper Mississippi valley. A thunderstorm passed northeast over Breese, Ill., in the early morning. A thunderstorm, with heavy rain and hail, visited Marshall, Ill., about 3 a. m.

A southeast gale demolished a number of small buildings in the southern part of Chicago, Ill. A heavy thunderstorm, with rain and small hail, moved northeast over Terre Haute, Ind., at 2.30 a. m., damaging buildings to the extent of \$5,000. A heavy rainstorm, with vivid lightning, passed northeast over Greencastle, Ind., at 3 a. m. Between 3 and 4 a. m. considerable damage was caused at Thorntown, Ind., by a thunder and rain storm. At Kokomo, Ind., a storm moved northeast in a path 150 feet in width at 4 a. m., killing one person and damaging property to the value of \$5,000. A thunder and rain storm, with heavy hail, moved northeast near Wilkinson, Ind., about 9 p. m.; the path was 300 yards in width, and the estimated value of property destroyed was \$4,000. A severe thunderstorm visited Findlay, Ohio, and vicinity from midnight to 3 a. m. Unusually severe local storms occurred in southeastern Lower Michigan in the evening.

A heavy thunder, rain, and hail storm, with high wind, prevailed at Adrian, Mich., between 7 and 8 p. m. About 7.30 p. m. a destructive storm passed northeast over Dundee, Mich., killing one person, and destroying 50 buildings valued at \$50,000 to \$75,000. At Rea, Mich., a storm moved northeast in a path 10 rods in width at 8.10 p. m., with sharp lightning and heavy thunder before its arrival, and rain and hail outside the path of destruction. At that place one person was reported killed, and many buildings were blown over. About 7 p. m. a tornado moved northeast over Ypsilanti, Mich., in a path 200 to 500 feet in width, attended by vivid lightning, continuous thunder, and heavy rain; the value of property destroyed in Ypsilanti was placed at \$100,000. At Detroit, Mich., a thunderstorm began 8.45 p. m. and ended 9.15 p. m., and a light thunderstorm continued from 10.45 to 11.30 p. m. The wind was high at intervals during the evening, and reached a velocity of 52 miles per hour from the southwest at 9.21 p. m.

A thunderstorm passed northeast near Redford, Mich., at 7.45 p. m., damaging property to the extent of \$6,000. A thunderstorm moving northeast visited Beech, Mich., about 8 p. m. A violent thunder, hail, and rain storm passed northeast over Royal Oak, Mich., at 7.30 p. m., in a path 80 rods in width, killing 2 persons, and destroying property to the value of \$50,000. At Utica, Mich., 40 buildings were injured or destroyed by a thunder, rain, and hail storm which passed northeast over that place about 7.30 p. m. Some damage was reported near Romeo, Mich. A thunder and rain storm moving east visited Lexington, Mich.; west of that place a barn was struck by lightning and burned.

13th.—A violent thunderstorm, with hail and heavy rain, moved northeast over Fort Smith, Ark., at 6 p. m., unroofing a number of buildings. A heavy thunderstorm, with high wind, rain, and hail, began at Little Rock, Ark., 9.20 p. m.; some damage was caused by hail. A severe thunder, rain, and hail storm was reported at Exeter, Mo. At Springfield, Mo., heavy hail began 2.04 p. m., and continued 9 minutes. The hailstones were very large and caused great damage to fruit blooms and vegetation. Fruit and crops were damaged by a thunder and hailstorm which moved southeast over Poplar Bluff, Mo., at 4.30 p. m.

14th.—Severe local storms occurred in the Southwestern States. At San Antonio, Tex., a thunder and rain storm moving east, with some hail, began 6.15 and ended 7.25 a. m.;

a number of houses were blown down, and others were unroofed. A heavy thunderstorm moved east over Houston, Tex., at 8 a. m., destroying property valued at \$5,000. Destructive gales were reported over southern Louisiana about noon. Two persons were reported killed in La Fourche Parish and one in Terre Bonne Parish, and the destruction of property was estimated at \$15,000. About 6.30 a. m. a thunderstorm moved northeast over Robeline, La., causing damage of a minor character. During a thunder and rain storm at Grand Cane, La., in the evening stock was killed by falling timber. A thunderstorm, with heavy rain and some hail, was reported at Houma, La., at 1.30 p. m.; the damage to buildings was placed at \$8,000.

At New Orleans, La., a thunderstorm began 2.56 and ended 4 p. m., and high winds, reaching a velocity of 48 miles per hour, continued from 3 to 3.30 p. m. A heavy thunder and rain storm moved southeast over Lonoke, Ark., at 8 p. m., unroofing buildings and prostrating shade trees. A thunder and rain storm moving east prevailed at Vicksburg, Miss., from midnight to 3 a. m. High wind caused damage about Duck Hill, Miss. During a thunderstorm in the early morning at Nashville, Tenn., a house was struck by lightning and electric wires were burned out. About 4 p. m. a tornado moved north of east near Henderson, Tenn., with loud thunder, vivid lightning, and heavy rain. The tornado had a whirling motion, and was attended by a terrific roaring sound. Many houses were wrecked, trees were stripped of bark to a height of 20 feet, and stumps and posts were pulled out of the ground.

16th.—A heavy rain and thunder storm began at Jupiter, Fla., at 2.45 p. m. and ended 8.05 p. m.; 2.20 inches of rain fell, and hail was reported near Jupiter.

18th.—An unusually heavy rainstorm, with thunder, prevailed at Galveston, Tex., during the evening and until the early morning of the 19th. A light rain and hail storm, with lightning, moved northeast over Boles, Ark., at 10 a. m., blowing down dwellings and trees. A thunder, rain, and hail storm moved southeast over Osage City, Kans., at 4.30 p. m., killing one person, and destroying a number of small houses valued at \$12,000. A rainstorm, with very large hail, passed northeast over Osawatimie, Kans., at 7.30 p. m. In the early morning a house was struck by lightning at Concordia, Kans. Several houses about Sedan, Kans., were destroyed by high wind. In the evening a heavy hailstorm was noted at Hebron, Nebr. A heavy hailstorm was reported at Lebanon, Mo., in the evening, and many farms in that section were badly washed by heavy rain.

19th.—Destructive storms were reported in the Southern States, the Mississippi Valley, and the upper lake region. At Galveston, Tex., a thunderstorm, with rain and high wind from the south, prevailed in the early afternoon. A severe storm visited the southern part of Terre Bonne Parish, La.; at Houma the rainfall was 4.72 inches in 21 hours. A destructive wind and hail storm occurred in the north part of Union Parish, La. A severe storm passed near Meridian, Miss., about 6 p. m. Heavy rain and some hail fell, and thunder was heard as the storm approached. Two persons were killed, 150 dwellings in the county were destroyed, and great damage was caused to farm lands. A thunderstorm, with heavy rain and large hail, moved northeast $\frac{1}{2}$ mile east of Pachuta, Miss., at 6.45 p. m. In a path 2 to 4 miles in width and 40 miles in length 250 dwellings were destroyed, and 3 persons were reported killed in Jasper County and 2 in Clarke County.

At Auburn, Ala., a thunderstorm began 5 p. m., and a heavy storm of wind and rain, with thunder and lightning, prevailed from 2 to 3 a. m., 20th. At 8 p. m. a tornado, with heavy rain, moved northeast near Pushmataha, Ala.; the storm had a whirling motion from right to left; the path

was 300 yards in width; several persons were injured, and a number of buildings were blown down. A destructive storm moved northeast over Midland City, Ala., at 11 p. m. Destructive thunder, wind, rain, and hail storms were reported in Florida. At Apalachicola small craft were capsized and larger vessels were damaged. Serious damage was reported in the afternoon about Bristol. Considerable damage was caused to timber, crops, etc., about Lake City, Federal Point, Green Cove, Fla., and Piscola, Ga. A heavy thunder and hail storm, with light rain, moved northeast near Prairie Grove, Ark., at 11.30 a. m. The storm had a whirling motion from right to left; its path was 200 feet in width, and 10 buildings, besides outhouses, were destroyed.

A violent wind and rain storm, with small hail, visited Fort Smith, Ark., about noon. A tornado, with funnel-shaped cloud, moved northeast at Flowery, Ark., about noon, destroying buildings in a path 200 yards in width, and killing one person. Thunderstorms occurred at Springfield, Mo., in the morning and afternoon, the afternoon storm being attended by small hail. In the evening rain, with a northwest gale, prevailed. Destructive gales, with thunder and hail storms, occurred in eastern Kansas. Some damage was caused by hail, and heavy rain caused washouts on railroads. Heavy gales prevailed over Kentucky and Illinois, with heavy rain at intervals. Over northern Illinois hard gales continued during the 20th and 21st, with snow flurries the afternoon of the 20th. Heavy gales prevailed over Minnesota, and an exceptionally heavy snowstorm set in over central and northern Minnesota in the evening and continued during the 20th. Over western Wisconsin gales and snow continued during the 20th. Heavy gales continued over the upper lakes during the 19th and 20th.

20th.—Destructive storms occurred in the Atlantic coast states, the Lake region, and the Ohio and upper Mississippi valleys. Easterly gales at night caused considerable damage in the middle Atlantic and west New England states and the lower lake region. Snow fell in southern New England in the morning. At Malone, N. Y., the gale was attended by thunder. A thunderstorm was reported at Harrisburg, Pa., at 10.20 p. m. Damage by high wind was reported in North Carolina. At Charleston, S. C., a southerly gale was attended in the morning by thunder and lightning. Damage to early cotton was reported in parts of South Carolina. A southeast gale and destructive local storms were reported in Georgia in the early morning. At Chipley, Ga., a heavy thunder, rain, and hail storm moved east of north in a path about 150 yards in width at 2 a. m., destroying property to the value of about \$2,000. A heavy thunder and rain storm moved northeast over Albany, Ga., about 2 a. m. Between 5 and 6 a. m. a thunderstorm moved northeast 10 miles south of Alapaha, Ga., blowing down a number of frame houses; one house was struck by lightning.

A heavy rain, wind, and thunder storm damaged crops about Quitman, Ga. At Poulan, Ga., a house was wrecked and one person fatally injured. Severe thunder, rain, and hail storms occurred in Florida. At Pensacola a building was struck by lightning, and the wind reached a velocity of 57 miles per hour. At Jacksonville 1.70 inch of rain fell in 1 hour and 6 minutes. At Port Tampa waves swept over the railroad tracks. Unusually severe storms prevailed over the Lake region; a number of marine disasters were reported, and heavy rain flooded streams and damaged crops. At Detroit, Mich., the wind reached a velocity of 72 miles per hour from the northeast. At Milwaukee, Wis., a shed on a crib which extended into the Lake was washed away and 15 men were drowned; considerable damage was also caused to the Government Breakwater. Heavy snow fell at Red Wing, Minn. Snow and high northwest winds prevailed over Iowa. Heavy rain and high winds prevailed on the north Pacific coast.

21st.—Destructive windstorms prevailed in the Atlantic coast states. At Groveton, N. H., a hotel in course of erection was blown down; estimated loss \$17,000. A heavy thunderstorm, with small hail, was reported at Titusville, Fla., in the early morning.

23d.—A heavy hail and thunderstorm occurred at Jupiter, Fla., in the early afternoon; the hailstones measured one inch in diameter and injured pineapples. The hailstorm covered an area of about 25 miles. In the afternoon a thunderstorm, with hail, and rain changing to snow, occurred at Salt Lake City, Utah. Streets in the southern part of the city were flooded, lightning struck the power-house of the street car company, and the temperature fell from 62° to 33°.

Tornado in Cleveland County, Okla., April 25, 1893.

The following is the substance of a report made by Mr. J. I. Widmeyer, Observer, Weather Bureau, Oklahoma City, Okla., on the tornado which visited Cleveland County, Okla., the evening of April 25th:

At Oklahoma City, 14 miles north of the section visited by the tornado, the afternoon was warm and sultry, with barometer low and unsteady, and wind fresh from the southeast. Heavy rain began 6.45 p. m. (76th meridian time), and ended 8.20 p. m., the depth of rainfall being 0.68 inch. At 10.30 p. m. the wind veered to south-southwest, and then to northwest. Before the sky became obscured by nimbus clouds from the southeast, cirrus and cirro-cumulus clouds were observed moving rapidly towards the southeast. At Norman, Cleveland County, light rain, with small hail, began 5 p. m. (90th meridian time), and was followed at 5.35 p. m. by a sudden heavy fall of rain and strong southeast wind. Immediately following the heavy rain the tornado was distinctly visible south of Norman, moving rapidly northeast. The storm was in view about 10 minutes, and broke up when about due east of the town, without having caused material damage. The funnel or center appeared like a spout lowered from the clouds, and was of a peculiar gray color. But little lightning was observed. About the time the first storm disappeared another cloud formed in the west. This cloud increased rapidly in size, and at 6.25 p. m. moved rapidly in a northeast direction, causing great loss of life and destruction of property. The appearance of the clouds attending this storm was remarkable. The outer clouds seemed to be driven furiously in to the center. No spout or funnel, and but little lightning, was observed, and no roaring sound was noted. In about 20 minutes the storm had disappeared in a northeast direction.

About 6 p. m. a heavy, dark cloud was observed 5 or 6 miles southwest of Moore, Okla. The cloud appeared to remain almost stationary, and was joined by other clouds which advanced from the northwest and southeast. These clouds appeared to dart quickly into the top, and become a part, of the larger cloud. About 6.30 p. m. the cloud began to revolve slowly from right to left and moved north of east with a sullen roar. The edges of the cloud seemed luminous, although no lightning was seen nor thunder heard. After crossing the Canadian River several "twisters" descended from the main cloud. These spouts, except one long one which trailed 50 to 100 yards behind the main cloud and swung to and fro, would disappear and others would replace them. The tornado was preceded by heavy rain, and a few large hailstones fell at Moore, 1½ miles from the path of the storm, and one hailstone struck a child on the head, breaking its skull. The first house struck by the storm contained 13 persons, 11 of which number were killed. The house was torn to pieces and the débris scattered over several acres of ground to the southeast. The few fence posts left standing were covered with mud. The supposition is that in crossing the river the storm sucked up quantities of water and sand or mud and deposited them on the edges of its path. An orchard northeast of the house was stripped of every twig and branch and many of the trees were completely stripped of bark. The orchard looked as though a fire had burned over it. About one-half mile south of this house a house and barn were scattered over several acres toward the northeast, and four persons were killed. About one mile northeast of the last-mentioned house a house was torn to pieces and the débris thrown southeast and northwest, and 6 persons were killed. A house one-half mile north of that point was demolished and the débris thrown south. In a wheat field between the points last named the wheat was blown close to the ground and lay pointing southeast, while débris from a house to the southeast was scattered over the field. In many places pieces of boards and scantling from the house to the southeast were driven deep into the ground. Two houses one-half mile south of the wheat field were scattered toward the north and northeast. The path of destruction was about one-half mile in width. Wire fences were rolled up into great balls. In a number of instances spokes were torn from wagon hubs, and in each instance, save one, the hubs were torn from the axle. In that instance the spokes and tire were carried away. Harrows with their teeth in the ground were undisturbed. The observer states, on the authority of a physician who had examined 14 dead bodies, that the persons killed were invariably injured on the left side of the face and body, and some had the appearance of having been burned. Thirty persons, in all, were killed by this storm and many were injured. Many of the houses destroyed

were small, frail structures, and probably \$25,000 would cover the loss to buildings in Cleveland County.

25th.—Tornadoes and heavy thunderstorms occurred in the Southwest. Near Case, Okla., about 10 miles northeast of Norman, a tornado moved northeast about 5.30 p. m. About 4.45 p. m. a tornado moved north-northeast about 3½ miles east of Case. Near Cimarron, Payne County, a tornado moved northeast at 3.30 p. m., destroying everything in its path. A tornado moved east one mile north of Perkins, Payne County, at 3.30 p. m. This tornado was followed by heavy rain and large hail, and some thunder and lightning. In a path 10 miles in length and averaging 80 rods in width 60 buildings were torn to pieces, 2 persons were killed, and two fatally injured; debris was thrown in all directions, limbs and bark were stripped from trees, and an ordinary square spade was carried 150 feet and driven into a solid oak tree one-half the length of the blade.

A tornado, moving northeast, was reported near Ransom, Payne County, about 5 p. m. At Langston, Logan County, a heavy thunder, rain, and hail storm moved southeast at 3 p. m., killing two persons. A tornado moved northeast near Bonita, Montague County, Tex., at 8.45 p. m., with sharp lightning, rain, and hail. In a path 75 to 250 yards in width 11 houses were torn to pieces, and 2 children were killed. This storm crossed the Red River 11 miles northeast of Bonita. A tornado, moving northeast, was reported 5 miles west of Saint Jo, Montague County, at 10 p. m. Heavy thunder, hail, and rain storms occurred in Arkansas. Three miles south of Winslow, Ark., 2 houses were blown down and stock was killed. A tornado was reported in the northwest part of Clay County, Ark., in the early morning.

About 8 p. m. a heavy thunder and rain storm damaged frail buildings and fruit trees north of Carthage, Mo. A destructive storm occurred east of Marion, Kans., about 3.20 p. m.; 2 houses were unroofed, and a barn was wrecked. Five miles east of Emporium, Kan., a house was struck by lightning. In the evening a house in Sioux City, Iowa, was struck by lightning. In Connersville, Ind., a flouring mill was struck by lightning and burned. At Lexington, Ky., a thunderstorm continued during the night of the 25-26th. At Nicholasville, Ky., a house was struck by lightning and burned. At 3.30 p. m. a heavy thunder, rain, and hail storm moved east over Miller, Miss., destroying about 20 houses, and prostrating timber.

26th.—In the morning a thunder and rain storm damaged crops about Melbourne, Ark. A thunder, rain, and hail storm moved northeast at Wabash, Ind., at 7.45 p. m. A very destructive storm appeared in the southwest part of Grant County, Ind., about 8 p. m., and leveled houses, timber, etc., in a path a few rods in width and about 20 miles in length. During a thunderstorm in the evening at Maysville, Ala., 3 horses were killed by lightning. A heavy wind and rain storm prevailed at night over northwestern Pennsylvania. In the evening lightning struck and fired a building in Grand Haven, Mich.; loss \$2,000. A northeast gale, with heavy, moist snow, began at Duluth, Minn., in the early morning. A storm of wind, thunder, and lightning passed over Leipsic, Ohio, in a path about 500 feet in width, at 11 p. m., lifting roofs, destroying outhouses, etc.

27th.—High winds caused considerable damage in north-west Ohio in the morning. A heavy thunder and rain storm visited Knoxville, Tenn., about 12.20 a. m. A violent storm damaged crops and timber about Greensburg, La., in the afternoon.

28th.—A tornado moved northeast over Cisco, Tex., at 9.30 p. m., in a path about three-fourths of a mile in width and 13 miles in length, with forked lightning, heavy rain, and large hail, killing 22 persons, and destroying property to the estimated value of \$400,000. About 6 p. m. a large fun-

nel-shaped cloud formed 5 miles southeast of Ponca, Okla., and moved southeast to a point 11 miles southeast of Ponca, where 6 persons and a quantity of stock were killed. Heavy rain on the 28th and 29th damaged farms about Lebanon, Mo. Heavy hail damaged fruit, etc., about Saint Charles, Mo. At Hannibal, Mo., hail fell from 11.20 to 11.25 a. m., and the hail was followed by a northeast gale. Damage by hail was reported at Farmland and Muncie, Ind. A thunder and hail storm occurred at Plant City, Fla., in the evening.

29th.—A heavy gust of wind, with thunder, sharp lightning, and rain occurred at Norfolk, Va., in the evening. Near Berkeley, Va., 2 children were killed by lightning. In the early morning a house in Cincinnati, Ohio, was struck by lightning. A stable was struck by lightning in Saint Louis, Mo. Six persons were drowned and property was destroyed

by flood near Winslow, Ark. During the 29th and 30th a heavy snowstorm prevailed in Millard, Beaver, and Iron counties, Utah.

30th.—A thunderstorm, with rain and hail, moved southeast over Wheeling, W. Va., at 5.15 p. m. A thunderstorm, with heavy rain, occurred at Cincinnati, Ohio, in the evening; great damage was caused by flood in the Mill Creek and Miami valleys. At Wyoming, near Cincinnati, a church steeple was demolished by lightning. A destructive storm was reported near Annapolis, Ohio. Late in the afternoon a violent thunderstorm moved from the southwest over Louisville, Ky. At 6.30 p. m. the wind reached an extreme velocity of 54 miles per hour. A destructive storm, with rain and hail, visited Eola, La., at 9 p. m., demolishing houses, uprooting trees, and damaging crops.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS.

The following table shows the danger-points at the various river stations; the highest and lowest stages for the month, with the dates of occurrence; and the monthly ranges:

Heights of rivers above low-water mark, April, 1898.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Height.	Date.	Height.	Date.	
<i>Red River.</i>	<i>Feet.</i>	<i>Feet.</i>		<i>Feet.</i>		<i>Feet.</i>
Shreveport, La.	29.9	19.4	1	12.1	17-19	7.3
<i>Arkansas River.</i>						
Fort Smith, Ark.	22.0	24.2	30	2.9	10, 11	21.3
Little Rock, Ark.	23.0	19.9	30	6.6	12, 13	13.3
<i>Missouri River.</i>						
Fort Buford, N. Dak. * ..		13.1	7	7.9	27, 28	5.2
Pierre, S. Dak.	14.0					
Sioux City, Iowa.	18.7	15.4	11	6.6	1	8.8
Omaha, Nebr.	18.0	15.1	12	7.1	2	8.0
Kansas City, Mo.	21.0	18.1	14	9.1	1	9.0
<i>Mississippi River.</i>						
Saint Paul, Minn.	14.0	12.4	30	7.3	1	5.1
La Crosse, Wis. †	11.8	10.5	8, 9	7.4	3	4.4
Dubuque, Iowa.	16.0	14.6	23, 24	6.2	1, 2	6.7
Iavenport, Iowa.	15.0	12.2	24	5.5	4	6.1
Keokuk, Iowa.	14.0	13.7	26, 29, 30	7.6	5	6.8
Hannibal, Mo.	17.0	15.5	30	9.0	7, 8	13.1
Saint Louis, Mo.	30.0	29.0	30	15.9	16	19.8
Cairo, Ill.	40.0	43.7	23, 24	23.9	10	15.5
Memphis, Tenn.	33.0	35.9	30	17.4	12, 13	10.8
Vicksburg, Miss.	41.0	40.8	30	30.0	17	3.8
New Orleans, La.	13.0	13.8	1, 2	10.0	18, 20, 21	16.2
<i>Ohio River.</i>						
Parkersburg, W. Va.	28.0	24.4	24	8.2	5	27.2
Cincinnati, Ohio.	45.0	42.8	30	15.6	6	8.7
Louisville, Ky.	24.0	15.7	30	7.0	7	
<i>Cumberland River.</i>						
Nashville, Tenn.	40.0	24.8	17	5.8	5, 6	19.0
<i>Tennessee River.</i>						
Chattanooga, Tenn.	33.0	12.1	15	4.8	13	7.3
<i>Monongahela River.</i>						
Pittsburg, Pa.	29.0	18.1	22	5.5	1	12.6
<i>Savannah River.</i>						
Augusta, Ga.	32.0	13.1	22	6.1	20	7.0
<i>Willamette River.</i>						
Portland, Oregon.	15.0	10.4	4-6	6.4	18, 19	4.0
<i>Susquehanna River.</i>						
Harrisburg, Pa.	17.0	10.9	23	5.2	30	5.7
<i>Alabama River.</i>						
Montgomery, Ala.	48.0	11.2	21	4.7	14	6.5
<i>James River.</i>						
Lynchburg, Va.	18.0	6.0	28	0.8	16	5.2
<i>Sacramento River.</i>						
Red Bluff, Cal.		21.4	6	6.5	20, 21	14.9
Sacramento, Cal.		25.2	8	23.3	22	1.9

* For 24 days. † For 28 days.
‡ Carrollton gauge readings from 4th to 30th, inclusive.

FLOODS.

On the 10th the Missouri River reached 15.7 feet at Sioux City, Iowa, damaging the construction work of the Pacific Short Line Bridge to the extent of \$5,000. Disastrous overflows of streams were reported in Minnesota and North Dakota. From the 28th to the 30th the Arkansas River rose rapidly at Fort Smith, Ark., and bottom lands in that section were submerged. At the close of the month the Mississippi

River was high and rising rapidly throughout its course. The Ohio, Wabash, and Arkansas rivers were also rising rapidly.

ICE IN RIVERS AND HARBORS AND OPENING OF NAVIGATION.

Navigation opened at Charlotte, N. Y., on the 1st, at Oswego, N. Y., on the 5th, and at Buffalo, N. Y., on the 15th. Navigation between Sandusky, Ohio, and Detroit, Mich., opened on the 10th. A steamer from Detroit arrived at Port Huron, Mich., on the 1st, opening navigation on the Saint Clair River. On the 3d a steamer left Port Huron for Sand Beach, opening navigation to that point. On the 9th a steamer arrived at Port Huron from Oscoda, Mich.; this was the first arrival of the season from a northern port. The first through boat of the season from Chicago, Ill., arrived at Port Huron on the 18th. On the 2d the river and bay at Alpena, Mich., were free from ice. At Sault Ste. Marie, Mich., ferryboats began running on the 18th. The boats landed at the lower dock, the upper dock being obstructed by ice. On the 28th ice moved from Mud Lake and Whitefish Point, leaving the river at Sault Ste. Marie free from ice. On the 29th a tug arrived at Sault Ste. Marie from Port Huron, opening navigation. On the 29th and 30th the river at Sault Ste. Marie was full of floating ice. Navigation opened at Manistee, Mich., on the 1st. High wind on the 12th cleared the Straits of ice at Cheyboygan, Mich., and a schooner sailed for Drummonds Island; this was the first departure of the season. On the 18th a steamer from Detroit arrived at Cheyboygan; this was the first arrival of the season. The harbor was reported clear of ice and navigation opened at Ludington, Mich., on the 7th. On the 18th a steamer from Chicago, bound for Buffalo, passed through the Straits of Mackinac. Considerable drift ice was encountered. The first boat of the season, excepting the regular winter-line boats, arrived at Grand Haven, Mich., on the 4th. At Green Bay, Wis., ice in the river was melting rapidly on the 2d, with spaces of clear water; 3d, river clear of ice, except near the shore; 13th, bay clear of ice; 17th, the first departure of the season; and 18th, the first arrival of the season. Navigation opened at Milwaukee, Wis., on the 13th, and at Chicago, Ill., on the 17th.

Ice went out of Lake Champlain at Burlington, Vt., on the 13th, and navigation at that port was resumed on the 17th. The Lake was reported clear of ice from Whitehall to Rouses Point on the 25th. The Kennebec River opened at Gardiner, Me., on the 12th. Navigation opened on the upper Saint Lawrence River by the 13th. The Fox River, Wisconsin, opened to the bay on the 3d, and the first steamer of the season passed through the locks on the 9th. Ice passed out of the Saint Croix River, Wisconsin, on the 10th. On the 25th the first