had scarcely emerged from the first storm area than she entered the second, and again experienced westerly winds of storm force, though of somewhat less violence.

On the 5th a small storm of some intensity appeared off the coast of Washington, at which time the Weather Bureau station at North Head reported a maximum wind velocity of 65 miles from the south, lowest pressure 29.58 inches, on the 6th.

Gales of force 7 to 10 were observed in middle latitudes and longitudes on the 6th to 8th and 11th to 14th, lowest pressure, 29.16 inches, on the 13th. On the 14th and 15th, in connection with a strong LOW then covering the Gulf of Alaska and adjacent waters to the southward, several vessels reported gales of force up to 10 and pressures below 29.00 inches. The Japanese S. S. *Shidzuoka Maru* experienced the lowest pressure, 28.63 inches, with a northwest gale, in latitude 49° 24′ N., longitude 145° 44′ W., on the 14th; and the American S. S. *Dellwood* on the same date encountered an east gale, force 10, in 58° 10′ N., 136° 39′ W. On the 15th the *Dellwood* reported a barometer "down to 28.90 inches (uncorrected) for six hours," with wind still high during the morning hours, while in and near latitude 59° 08′ N., longitude 141° 35′ W.

On the 22d to 24th the British S. S. *Empress of Asia* passed through one storm central near the Peninsula of Alaska, and entered another over the western Aleutians. On the 22d, in approximately latitude 52° N., longitude 154° W., she experienced a wind from the south, force 10, pressure 29.18 inches; on the 23d, in 52° N., 164° W., she observed a northwest wind, force 10, pressure 29.56 inches; and on the 24th, in 51° N., 176° W., a southwest wind, force 8, pressure 29.64 inches. These storms were of the Aleutian LOW type.

Among the few gales thus far reported for the period April 25 to 30, the American S. S. *Stockton* experienced one from the west, force 8, in 46° 41′ N., 169° 06′ W., pressure 29.97 inches, on the 29th. On the same date the Japanese S. S. *Yokohama Maru* encountered a west-northwesterly gale, force 8, lowest pressure 29.42 inches, in 50° 14′ N., 139° 04′ W. On the 30th North Head recorded a maximum wind velocity of 58 miles from the south, in connection with a storm area central to the westward of British Columbia.

On the 26th of April Observer Dumaresq, of the American S. S. *Atlanta City*, San Pedro toward Yokohama, the wind being light at the time, witnessed a peculiar condition which he thus describes:

> The sharpest shift of wind and sea I have ever seen occurred April 26, at 4 p. m., in latitude 34° 19′ N., longitude 150° 20′ E. Wind and sea had been SW. all day, and as suddenly as though a fan had been turned both wind and sea shifted to NW. We could plainly see a narrow stretch of confused sea where the two met.

During the greater part of the month the series of low-pressure areas which dominated the weather over the Aleutian region and over a wide stretch of ocean from the Peninsula of Alaska southeastward, were more energetic even than during March. In general they formed two centers of activity, one of which may be placed nearly over Dutch Harbor on the west and the other over the northern portion of the Gulf of Alaska on the east.

The North Pacific high-pressure area, normally central to the northeast of Hawaii, was generally well developed after the 10th of the month. Prior to that it was distorted and shallow, with low-pressure areas occupying a portion of its normal area on the northeast or northwest. At the close of the month its center had moved to the westward and northward, with a crest of 30.50 inches near latitude 40° N., longitude 155° W.

Pressure was below normal over the eastern part of the ocean, as shown by observations at the island stations. In this respect conditions were similar to those of the preceding month. In April, however, the greatest relative deficiency was at Dutch Harbor (−0.28 inch), whereas in March it was at Honolulu (0.07 inch). The average pressure at Dutch Harbor, based on p. m. reports, was 29.57 inches. The highest pressure, 30.16 inches occurred on the 25th; the lowest, 28.82 inches, on the 8th. Absolute range, 1.34 inches. At Honolulu the mean p. m. pressure was 30.02 inches, or 0.04 inch below normal. The highest pressure, 30.15 inches, occurred on the 12th; the lowest, 29.79, on the 25th. At Midway Island the mean p. m. pressure was 30.11 inches, or 0.02 inch below normal. The highest pressure, 30.28 inches, occurred on the 28th; the lowest, 29.88, on the 29th and 30th.

Fog was observed almost daily over the northern and central routes both east and west of the 180th meridian, but was of particularly frequent occurrence after the middle of the month. It was noted on the China coast on several days as far south as Swatow and Hongkong.

DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

ALFRED J. HENRY.

Aside from the variability characteristic of a transition month, the weather of April, 1923, presented no distinctive features of consequence.

Many secondary cyclonic systems had their origin over the southern Plateau and Rocky Mountain region, and when such is the case the anticyclones almost invariably appear in Canadian Provinces and move east-southeast as was the case in the current month—see Charts I and II. The usual details follow.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

Fifteen low-pressure areas developed over the south and southwest or entered the country on the Pacific coast. This is an unusual number for the season of the year and would be rather excessive even for a winter month. However, the dampening effect on the movements of the cyclones and anticyclones, which is a normal occurrence in April, was quite noticeable before the end of the month. This slowing up, and in some cases reversal of the general circulation, is due to the change in pressure distribution over land and water areas. This change is slow and masked by the passing cyclones and anticyclones; but as the continents rapidly warm, we see them change from areas covered normally by high pressure to areas of indifferent or low pressure, and at the same time the pressure is rising over the relatively colder water areas.

FREE-AIR SUMMARY.

By L. T. SAMUELS, Meteorologist.

Free-air conditions for the month averaged in most cases close to their normal values. (See Table 1.) Negative temperature departures obtained at nearly all levels at Broken Arrow, Due West, and Royal Center,