ward to New Zealand and Australia, northwestward to the Hawaiian Islands, northward to the coast of Oregon; and this was repeated in May, 1877.

4. The Sun's Heat: a Cause of Varying Temperature and Density.

Evaporation causes an increase in the proportion of salt in the ocean, or in its salinity, and thereby an increase in density; and this is under certain conditions a potent cause of currents. The Mediterranean Sea affords an example. It has been estimated that this sea loses annually 60 per cent of its water by evaporation, and receives, through rivers and precipitation, about 30 per cent; so that there is a deficit of 30 per cent which is supplied by the Atlantic through the straits of Gibraltar. It is consequently inferred that if the connection with the ocean were cut off, the sea would be reduced to a great basin with two intensely salt "Dead Seas," an eastern and a western. (It has been suggested that this may have been its condition during or since the Glacial period.) In consequence of this loss by evaporation, the water is $\frac{1}{12}$ more saline than that of the Atlantic (page 49). On account of this condition the sea has an inward and outward current at Gibraltar; the latter carrying off the denser Mediterranean waters; the former resupplying the loss resulting from both evaporation and the outflow. It has been calculated that the inflowing current is equivalent to a current eight miles wide, 600 feet deep, moving at the rate of 18·3 miles in 24 hours. The currents being reversed with the tides, this is the balance of the inflow over the outflow in the upper current. (Carpenter, 1872; Buchanan, 1883.) On the varying salinity of sea water, see page 121.

MECHANICAL EFFECTS.

1. Tidal Wave and Currents.

1. *The tidal inflow.*—Since the tidal wave becomes a translation wave on soundings, it thereby gains theoretically some power of transportation. But on open coasts the *inflowing* movement at the rate of a few feet only in six hours is *too slow for much efficient work.* Its feebleness as a geological agent can be best appreciated during a calm day on the seashore when, although the air and waters are seemingly at rest, the tide is nevertheless rising.

The tidal wave in its landward movement follows the deeper parts of the bays and sounds, where friction is least, and with less velocity their coasts. It is therefore weak in sea-border work. This is well shown by the cotidal lines of Long Island Sound on the preceding map as laid down by Schott. These lines reach the coast of the Sound along its western half *nearly at the same time.* The tide enters the Sound along its bottom, as an "underrun," one and a half hours before the ebb of the surface waters has ceased (E. E. Haskell).

The rising tide affords the wind-made waves a chance twice a day to ply their blows against cliffs and beaches at regularly changing heights, and thus