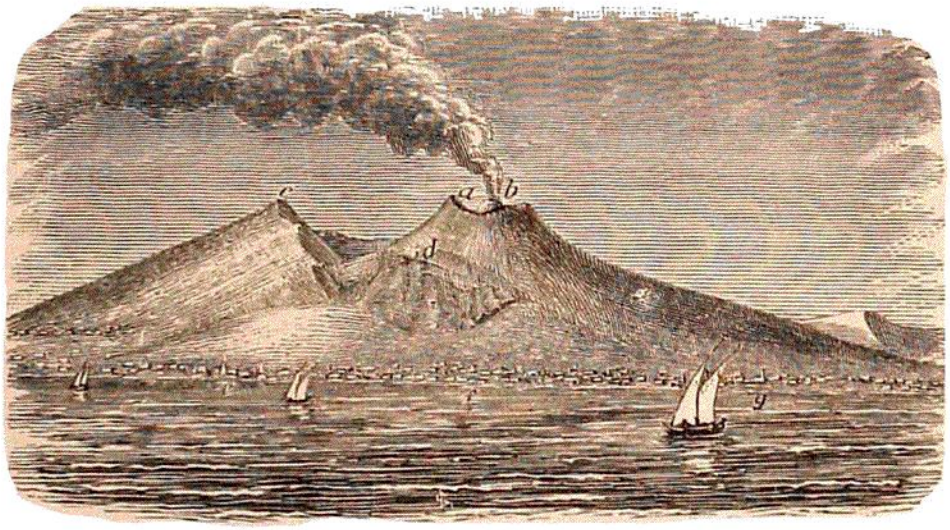
The common effects on the rocks are: the covering of small surface spots, or depressions, with beads of glass, or with sinuous glassy lines sometimes radiating; the production of tubes sometimes half an inch or more in diameter, descending with diminishing size a few inches into the rock, and sometimes dividing downward; the glass being such as the rock, or some of its more fusible ingredients, would afford on fusion. The usual absence of microlites is regarded as an indication of the sudden cooling of the glass.

Specimens from Mount Thielson, Oregon, south of the Columbia, where the rock is hypersthene-basalt, consist, according to Diller, of a coating of patches and beads of glass, and also of tubes $\frac{1}{3}$ to $\frac{2}{3}$ inch in diameter, having a brownish glass within, which descend 2 to 3 inches into the rock. On West Peak, east of the Sangre de Cristo Range, Col., tubes glassy within, and surface-depressions with beads of glass, occur in augite-dioryte, and in one place a tube appeared to follow the course of a small vein of ore (R. C. Hills, 1890). A fulgurite-glass, occurring in the Alps on Mount Viso, coating furrows made in glaucophane schist, was peculiar in containing microlites (Rutley, 1889).

The disrupting power of lightning is sometimes shown in the fracturing of rocks, and it is supposed that this may have been, in past time, an important agent of rock-destruction. But this theory is opposed by the fact that the strokes producing fulgurites have done very little shattering.

225.



Vesuvius as seen from the harbor of Naples. D. July, '34.

The burning of coal-beds has produced scoria and other igneous results in North Dakota and Montana. But the mode of ignition of the beds is not known. A stroke of lightning is the most probable agent. It is hardly possible that chemical changes ever occasioned it. In the States above mentioned the burning of coal-beds of the Lignitic Tertiary has changed clays to hard and sometimes porcelain-like rocks, usually reddening them, and also to beds of a half-fused cellular or scoriaceous and pumice-like character, looking like the products of a volcano. One of the regions thus burnt over, on the Little Missouri, is 20 to 30 miles broad by 200 miles in length. Others occur in the Yellowstone at the mouth of Powder River and along the latter stream; about the sources of Tongue River, within a few miles of the Big Horn Mountains, and on the north fork of the Cheyenne River, as observed by Hayden. Fragments of pumice have been found on the Missouri as far south as Pierre, and the early explorers supposed them to be the products of