from the deep-seated rock that has yielded also the oil, and some higher temperature than that of the surface was needed for its production. At a depth



Water-and-gas geyser.

of 1415 feet in the drilling a very heavy "gas vein" was struck, and this was the chief source of the gas. Ashburner remarks further that several other wells in the oil-regions have had similar geysers; and as early as 1833, in the valley of the Ohio, a salt well threw jets of water and gas, at intervals of 10 to 12 hours, to heights of 50 to 100 feet.

The original source of the oil is supposed, by most writers on the subject, to have been a Devonian shale, like the Genesee or Marcellus, below the level of the Chemung beds, from which it was evolved by a slow process of distil-The conditions necessary for lation. oil, on this view, are (1) a primary source of the oil; (2) strata to receive and hold it; and (3) overlying deposits to prevent its escape to the surface and consequent dissipation. These three conditions are fulfilled by (1) a deepseated carbonaceous rock containing abundant organic remains; (2) an overlying porous stratum; and (3) superincumbent shales, slates, etc. These

statements also apply to gas production. Slight subterranean movements attending the making of the Appalachian Mountains to the east and southeast would have produced some heat, and so have caused oil to escape from the shales; and the vaporized oils would have risen until they were somewhere condensed — either in confined places in or among the rocks, or still higher in the open air (Peckham, 1884). I. C. White regards the source as organic materials within the sand-beds.

The oil wells of western Pennsylvania yielded, in 1891, 31,793,477 barrels of the crude oil, or petroleum. Of this, 5,452,418 barrels were from the Bradford district, McKean County, and 10,317,258 from Alleghany County, the county of which Pittsburg is the capital. In the same year, the yield of Alleghany County, N.Y., adjoining the northern end of the Pennsylvania belt, was 1,121,574 barrels; and that of West Virginia, adjoining the southern end, 2,406,218 barrels. The total yield of the United States in 1891 was 54,291,980 barrels. Ohio produced 17,740,307 barrels, making the yield for Pennsylvania and Ohio together 49,533,784 barrels. But the oil of Ohio was nearly all from the Lower Silurian Trenton limestone — this formation affording 17,316,000 barrels; the Berea grit, which is referred to the Subcarboniferous, supplied only a few hundred thousand barrels.

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