shale in Scotland by about seven or eight years. The New Brunswick industry was, however, put out of business by the United States oil wells. Young, owing to the exhaustion of the Torbanehill mineral, was compelled to look elsewhere for raw material; this was obtained in the form of so-called bituminous shales found in the vicinity of Broxburn and other parts of Midlothian. There are a very large variety of these shales giving varying percentages of oil and ammonia. Some of the shales employed yield as high as 36-40 gallons of crude oil and 35 pounds of ammonium sulphate, while others, as Pumpherston shale, gives 16-22 gallons of oil and 50-60 pounds of ammonium sulphate. About the same time as the Scottish oil manufacturers lost their rich raw material, Torbanehill mineral, another evening appeared on the market in the form of imported burning oil from the American petroleum wells, and this necessitated the shale oil manufacturer making changes in his method of production. The horizontal retort of Young gave way to the circular vertical retorts introduced by the chemist, and until this time little attention was given to the heavy oils and paraffin wax, which as the result of careless manufacture, were largely decomposed in the destructive distillation of the shale. But competition in the form of American oils rendered economical and improved method necessary, and special attention was given to obtain as large a yield as possible of lubricating oil, from heavy oils, and paraffin wax. To prevent the dissociation of the heavy oils and also the paraffin, steam was injected at the bottom of the vertical retort to carry away the products formed in the distillation. This resulted in an increased yield of crude product, and also improvement in quality, while at the same time the condensation water was utilized for the production of ammonium sulphate. But again the American enemy appeared with lubricating oils and paraffin wax, and this competition had to be stopped. New forms of retort, larger in size, employing less fuel for heating, giving larger yield of oil and ammonia. The methods for refining the oil and wax were improved. During this period of opposition the Scottish shale oil works saw the Henderson retort, followed by William Young & Beilby's, and latter by the Philipstown (Crichton) and Bryson (Pumpherston).

During the past forty years it may be said the Scottish oil works have had to meet the opposition of the natural oil wells of America, and they have accomplished it successfully. This has been done largely by improved methods of manufacture, and not by any find of better raw material.

The cost of the distillation of the shale, for example, has been reduced by nearly two-thirds (⅔) in the last 30 years, the cost of refining, calculated to crude oil, has been reduced from 2s. 2d. per gallon to 7$\frac{7}{10}$d. per gallon. As an example of the reduction made in the cost of the distillation of the shale, it is only necessary to point out that the new Bryson retort (Pumpherston) has cut the price nearly in two. According to Beilby the shale distillation in his retort, which is the most largely employed, costs 24d. per ton, while with the new Bryson retort it costs only 12d. per ton.

So much for a synoptic history of the up-hill fight of the Scottish oil industry, in which over eight millions of dollars are invested. In 1907 these companies paid dividends of 5, 15, 15 and 50 per cent, and 1908, 7, 15, 17, 5 and 50 per cent respectively.

Scotland is not the only country with shale oil industries. In France bituminous shale is distilled for oil at Buxiere les Mines and Autun, the former having been worked since 1858 and the latter since 1862. The former yields about 60 gallons of crude oil per ton. In Australia we also find the shale oil industry in operation.

An industry closely allied with the shale oil manufacture is the so-called 'brown coal tar oil' of Germany, and particularly located in the Prussian province of Saxony. The method of the manufacture of oil from the brown coal, or lignite, resembles in many respects that employed in Scotland for shale, although the crude products are not identical. That the Germans consider the shale oil industry of great value as well as the brown coal oil, is evinced by the fact that Dr. Graefe, the best German authority on brown coal tar oil manufacture, has been sent, at public expense, to