coal, the quality of coke is poorer and the ash and sulfur are high. The average ash is in the neighborhood of 14 or 15 per cent., and often running up to 16 and 18 per cent. where proper attention is not paid to preparation and coking. The Birmingham district of Alabama produces a fairly large amount of good beehive coke, with an ash content averaging 11 per cent., but such coke is the exception and not the rule.

Range of composition of above coke:

	PERCENTAGES
Moisture	0.75 to 1.34
Volatile matter	0.75 to 1.95
Fixed carbon	91.20 to 77.81
Ash	7.30 to 18.90
Sulfur	0.58 to 1.77

Beehive coking operations in the States of Illinois and Indiana are practically at a standstill. A few ovens for experimental purposes have been built in these States and have demonstrated the practicability of producing coke from some of these coals. The coking possibilities of Illinois and Indiana coals is confined to small areas, and beehive operations will hardly be established in these fields.

Kansas, Missouri and Oklahoma have had poor success in the production of coke and the total output from these States is very small.

Practically all the coke from the States of Colorado and New Mexico is made from coal previously washed and crushed before charging into the ovens. A plant of 350 beehive ovens of concrete construction is one of the novelties of this region. The ovens proper are of the ordinary beehive type, 13 feet in diameter and $7^1/_2$ feet in height, constructed of firebrick and tile. The ring walls and wharf walls are of plain concrete, the battery walls and larry track columns of reinforced concrete. The yield of coke is reported above the average for the region and is believed to be due, in great measure, to the concrete construction which prevents the entrance of excess air so common in cracks developed in ordinary beehive construction. For details of this plant the reader is referred to *Mines and Minerals*, February, 1910, pages 429 to 432. At another plant in this region the ovens are provided with underflues which convey the gases from the coal under the oven bottom to a large flue, back of the ovens, which carries it to the power-house. This power plant furnishes all the power for operation of the mines, for ventilation, electric haulage, coal washing and crushing, and steam heat for the Company buildings and electric lighting for the entire community. The flues under the oven bottoms serve to hasten the coking and prevent black ends. The operation requires careful watching to prevent the coal from coking up from the bottom as well as down from the top. When the bottoms become too hot and this coking upwards does take place a distinct line of demarcation, where the two operations meet, is seen over the whole charge of coke.

The cokes of these States are uniformly low in sulfur, scarcely ever exceeding 0.75 per cent., but the ash is high, averaging 16 per cent.

The coals used for manufacture of coke in Utah are practically identical in character with those of western Colorado, but exhibit the surprising characteristic of losing their coking properties and becoming non-coking if kept in storage for any length of time.

Montana produces a very small amount of coke, all of which is used in copper smelters. Attention is called to the fact that the only restriction placed on the coke is that the ash content shall not exceed 20 per cent. This restriction is only complied with when the coal is washed. An average analysis of this coke shows 18.00 to 21.00 per cent. ash and over 2.00 per cent. sulfur.

Washington is the only State west of the Rocky Mountains that contains coking coal and the area within the State is small. All the coke is made from washed and crushed coal and is of fairly good quality. An average analysis of this coke follows:

	PERCENTAGES
Moisture	0.92
Volatile matter	1.50
Fixed carbon	79.58
Ash	18.00
Sulfur	0.52

BUREAU OF MINES EXPERIMENT STATION
PITTSBURGH

AMERICAN OIL SHALES[1]

BY CHAS. BASKERVILLE

In several communications by the author on the economic value of the oil shales of Canada,[2] it was shown that the beds of oil shale in New Brunswick are very extensive, that the principal by-product obtained on retorting (under suitable conditions), ammonium sulfate, will often more than bear the expense of mining and treatment, and that the crude oil obtained by retorting New Brunswick oil shale is essentially the same as the petroleum of the mid-continent field. The importance of these large deposits of fuel oil has been appreciated, for a strong company, The New Brunswick Shale Co., Ltd., capitalized at $5,000,000, has been organized for their development. The formation of this Company and the doubtless early working of the New Brunswick shale deposits have aroused much interest in other parts of the Dominion, especially in New Foundland, Nova Scotia, and Ontario, where other oil shales occur, as well as in the United States.

The commercial success and tribulations of the shale oil companies now in operation in Scotland are well-known.[3] The oil shales in the Wolgan and Capertee Valleys, New South Wales, Australia, and at Autun and Buxiere les-Mines, France, are also being worked, while the Orepuki, New Zealand, and Camamu Basin, Brazil, oil shales were found, upon being worked, to be low-grade and to require high development charges. Although a company is being organized to acquire the oil shale properties situated near Ermelo in the Transvaal, the author is unaware of any large operations on the oil shale deposits of Spain, Austria-Hungary, Turkey, Tasmania, Mozambique, Natal, Italy, and the United States for the production of crude oil and ammonium sulfate. In this country, from 1854 to 1860, various bituminous materials were distilled for the production of illuminating oil by fifty-five "coal oil" companies, but the process followed was very crude and ammonium sulfate recovery was never attempted. Consequently, although many of the coals and other materials used were of high-grade,[4] and merit investigation as to yield of oil, gas, and ammonium sulfate according to modern practice, it is not surprising that the discovery of petroleum paralyzed the industry. However, interest in these deposits and raw materials of more or less similar properties is awakening.

In the United States, oil shales[5] occur in Kentucky; on the Humboldt River, opposite to Elko, Nevada; on the Big Blackfoot River and near Great Falls, Montana; and in the Cholame Valley, north of Parkfield, California. Some of these are of good quality, but none has been worked to any extent. It is likely, however, that the increasing demand for liquid fuel and ammonium sulfate may occasion a thorough investigation of these deposits. Some time ago the author examined a sample of oil shale from Montana. This shale was friable and blaey, being weathered; it yielded 41.5 pounds of ammonium sulfate and 6 gallons of crude oil per short ton.

Some carbonaceous shale is being used in the manufacture of

[1] Paper presented at the Eighth International Congress of Applied Chemistry, New York, September, 1912.

[2] *Proc. Seventh Internat. Congr. Appl. Chem.*, **1910**, Section IV; *Eng. Min. J.*, **88**, 149–54, 195–99; THIS JOURNAL, **1**, No. 8 (1909).

[3] See Ells and Hamor, Canada Department of Mines, *Report* **55**, Mines Branch, Ottawa, 1910.

[4] Baskerville, *Eng. Min. J.*, **88**, 151.

[5] Reference is had here to shales which contain an *oil-forming* substance, kerogen, which gives rise to oily and tarry matters on destructive distillation; and not to *oil-bearing* shales, from which petroleum may be obtained by mechanical means.

paint in the United States, but in the processes employed the nitrogen present is not recovered.[1]

The oil shale deposits of America constitute a fertilizer as well as a fuel resource of decided economic possibilities. However, the methods by which these resources may be utilized with greatest profit require careful inquiry.

COLLEGE OF THE CITY OF NEW YORK

CURRENT INDUSTRIAL NEWS

By W. A. HAMOR

THE INDUSTRIAL FUTURE OF MAINE

On November 1, 1912, Arthur D. Little delivered an address on "The Relations of Chemistry to the Industries of Maine," before the Maine Section of the American Chemical Society in Bangor. After discussing the general relation of chemistry to the textile, lumber, paper and pulp industries, Dr. Little took up certain topics which seemed to be of special importance in considering Maine's industrial future. Among the most important of these were: The production of methyl alcohol from wood waste; the Maine peat deposits, and the great adaptability of this section to electrochemical manufacturing on account of the immense amount of water-power available. There can be no question about the great industrial future of Maine, and it is to be expected that Dr. Little's inspiring address will arouse the interest of manufacturers.

REINFORCED PLATINUM

B. D. Eldred has patented (U. S. Patent 1,043,576) the employment of one of the metals of the iron group as a backing to reinforce platinum. The platinum surface of the compound metal imparts resistance to the action of acids, while the iron-group metal used is of sufficiently high melting point to retain the property so useful in platinum, *viz.*, infusibility. The method of producing the compound metal is as follows: The metals are cleaned, and the base metal is heated through the platinum sheet by means of an oxygen or enriched-air flame to surface fusion of the base metal, then arresting the heating, as welding begins at that time. Another patent (U. S. Patent 1,043,577) pertains to the production of bimetallic plates by casting the ferrous metal, superheated, against the platinum; this is preferably accomplished in a U-shaped mold, casting the metal down through borax or a similar flux, and allowing it to rise in the other leg, against the platinum surfaces. The superheated metal of the iron group is produced by reduction of, say, iron oxide by aluminum. Eldred has also patented (U. S. Patent 1,043,579) the manufacture of spun ware from compound sheets, double-faced with platinum.

IRIDIUM IN AMERICAN PLACER PLATINUM

F. W. Horton (*Eng. Min. J.*, **94**, No. 19, 873–5) points out that the unprecedented and ever-increasing demand for the various alloys of platinum and iridium, coupled with the limited production of both the component metals, has resulted in an almost uninterrupted rise in their price. The demand which has more than doubled the price of these metals and made iridium over three times as valuable as gold, has come largely from the jewelry trade. The superiority of "hard platinum" as a setting for diamonds, pearls and light-colored precious stones, both from an artistic standpoint and from that of durability and safeness of setting, together with the high price of the alloy, has made it very fashionable, and this firmly established demand greatly exceeds the supply.

Iridium not only makes a hard alloy with platinum, but it gives the alloy a greater electrical resistance and higher fusing point than that of pure platinum, and is consequently used in resistance coils and also in thermo-couples for the measurement of high temperatures. The proportion of iridium in the alloy ranges from 5 to 20 per cent., rarely exceeding the latter amount except in the case of special alloys where great hardness is desired. Alloys containing less than 10 per cent. of iridium are ductile and malleable. Where the alloy contains 30 per cent. or more iridium, it is no longer attacked by *aqua regia*. The properties of extreme hardness, high melting point, and insolubility render iridium particularly adapted to certain uses, as in the manufacture of knife edges for delicate balances, standard weights, pivots, contact points, etc. Pure iridium is, however, difficult to work because of its brittleness, and is, therefore, usually alloyed with a small percentage of platinum even when great hardness is desired. The natural alloy of iridium with osmium, iridosmine or osmiridium, is, on account of its great hardness, used for watch and compass bearings and for tipping fountain-pen points. (An ounce of iridium is sufficient for making about 7,500 pen-points.)

The iridium used in this country is obtained principally from Russian crude platinum, which generally contains from 1 to 3 per cent. of the metal. Similar small percentages of iridium are also obtained from the crude platinum which is imported from Colombia, and this amount is supplemented by an annual domestic production of 100 or 200 ounces. The total imports of "iridium and iridium in native combination with platinum metals" into the United States in 1911 amounted to 3905 ounces, valued at $210,616; less than 3.2 per cent. as much iridium as platinum was imported.

It is quite generally known that a small percentage of iridium is usually found in the small quantities of crude platinum which are produced annually in the United States as a by-product of placer mining; but Horton calls attention to the high percentage of iridium associated with the crude platinum from certain districts in this country and the comparatively large amount in which the metal might perhaps be obtained if the potential sources of supply were thoroughly investigated. There is at least one considerable area, and probably two, in Trinity County, California, where the gravels contain approximately twice as much iridium as platinum; and in the Oroville, California, district, the crude platinum contains a considerable percentage of osmiridium. The richer gold placers along the Trinity River, within the area where platinum metals occur, are at present largely exhausted, and the few hundred ounces that are now produced annually as a by-product in gold mining go but a little way toward satisfying the domestic demand. However, Horton inquires: "Is there not a possibility that in these areas there are gravels rich enough in the metals of the platinum group to be worked successfully where the gravel could not be mined at a profit for gold alone, and this because the gravels of the region have been prospected only for gold and without

[1] The Nashville Carbon & Oil Company, of Nashville, Tenn., are producing a "natural carbon" paint ("Durbon") from shale; the raw material is heated in air-tight retorts, and from 8 to 10 gallons of crude oil are produced from 1 ton. Both the dark oil and the black residue are used. The Natural Carbon Paint Company, of Freeport, Ill., formerly mined carbonaceous shale both in Mt. Carroll and Eleroy, Ill.; this was distilled in special retorts, and black carbon pigment, shale oil, and gas were obtained as products. The shale oil was said to contain a large percentage of ichthyol, but it was not utilized, the manufacturers operating the plant having been only interested in the production of a pigment suitable for what was regarded as an anti-corrosive and steel protective paint. For two years, up to November 1, 1911, the plant was operated by a Chicago paint company.