carried by warships. Its use is likely to be discontinued entirely as soon as suitable heaviy oil motors for the small power boats are developed. As stated above heavy oil engines are already supplanting gasoline engines in submarines.

The United States navy has at Philadelphia a fuel-oil testing plant where all grades of fuel oil are tested, many different designs of burning apparatus, different heaters and different forms of air admission are maintained. Actual use aboard ship indicates that about 200 gallons of oil is equivalent in power to one ton of good coal. That is not quite five barrels. In actual heat units a pound of fuel oil contains about 19,500 British thermal units, the navy standard steaming coal runs a little over 14,500.

Oil used on the east coast comes from Oklahoma and Texas. However, experiments at Philadelphia show very little difference in steam production between oil from different parts of the country. There is one thing—navy fuel is not permitted to have a flash point below 150 deg. F.; that is, on a closed cup, whereas in locomotives, in power plants, and on some merchant vessels, California crude is used, and a large amount of Mexican crude, where the flash point might be lower than 150 deg. So that fuel oil for the navy is oil that has been subjected to some refining treatment, and had the lighter and more volatile products removed.

COAL MINE DISASTER ON VANCOUVER ISLAND, BRITISH COLUMBIA.

Twenty-two miners lost their lives on the afternoon of May 27, when an explosion occurred in the Western Fuel Co.'s Reserve mine, situated about five miles from the company's shipping docks at Nanaimo, Vancouver island, British Columbia. As the mine is a comparatively new one, it has not yet been extensively opened, so the number of men working in it was not large—only 36 at the time of the disaster, and of these 13 were rescued uninjured and one, who though badly hurt, is likely to recover.

The cause of the explosion has not yet been ascertained. The Provincial Department of Mines has commissioned Mr. James Ashworth, of Vancouver, B.C., a coal mining engineer of lengthy and wide experience, to make an investigation. Mr. Joseph G. S. Hudson, of Ottawa, of the Explosives section of the Canada Department of Mines, and Mr. Thos. Graham, chief inspector of mines for British Columbia, are also at the mine.

The Reserve mine is near the centre of a 2,500 acre virgin coal field in Nanaimo and Cranberry districts; it has been opened by two shafts, main and auxiliary, 350 ft. apart, dimensions 10 x 26 ft. inside of timbers. In April, 1913, a 10 ft. seam of coal was reached at a depth of about 1,050 ft. The development of the mine was delayed by the strike of coal miners on May 1, 1913, and it was not until 1914 that much progress was made toward opening the coal. The mine equipment—machinery and plant, fan, etc.—is modern, and all plans are for an eventual production of 1,500 to 2,000 tons of coal a day. Approximately $750,000 has been expended in developing and equipping the mine and in construction of a standard gauge railway from mine to shipping docks.

MINING ROYALTIES AT COBALT*

By A. A. Cole.

As there appears to be some misconception as well as lack of appreciation of the reasons for the royalties payable by certain mines at Cobalt, the following explanatory notes may be of interest:

When the Timiskaming & Northern Ontario (Ontario's Government railway) was started, the Government placed the management under a Commission. The railway was granted a right-of-way and also certain townsites along the line of location. Later on the Government also granted to the railway the minerals underlying the right-of-way and under the townsites except where these had already been disposed of. In the vicinity of Cobalt these mining rights proved very valuable both in the case of the right-of-way itself and also under the townsite.

Instead of undertaking mining operations itself the Railway Commission divided its mining lands into convenient lots or parcels and leased them to companies or individuals, who acquired them by public tender. In this way the following four leases have worked and made returns to the railway:

The Cobalt Townsite Mining Company, The City of Cobalt Mining Company, The Right of Way Mining Company, The Nancy Helen Mines, Limited.

The company acquiring a lease paid a cash bonus to begin with and thereafter a royalty on shipments. Originally the royalty was based on the value of the ore at the collar of the shaft, but this was later changed to a percentage of the net profits.

The policy of the Railway Commission has been to assist the lessees from time to time by a gradual reduction of royalties as the resources of the mines were exhausted. This has worked out in a satisfactory manner both to lessor and lessee.

Each lease started out by paying 25 per cent. royalty on the value of all shipments at the collar of the shaft, with the one exception of the Townsite Company, which was supposed to pay 50 per cent. royalty on all ore assaying over $1,000 per ton, and 25 per cent. on ore assaying lower than that amount. This was early considered unsatisfactory and a uniform royalty of 25 per cent. on gross value was adopted. The next reduction was to 25 per cent. net, or to be more explicit, 25 per cent. on profits calculated as in the Supplementary Revenue Act (now called The Mining Tax Act).

The further successive reductions have been to 20 per cent., 17 per cent., 15 per cent., 12½ per cent., 10 per cent., and 7½ per cent. On July 1st, 1914, all leases from the Railway Commission were reduced to 7½ per cent., and the agreement now stands that this will be the royalty till September 1st, 1915, on which date all royalties will be reduced to 5 per cent. on profits.

By the above leasing system the lessee only pays a royalty on ore recovered. The fairness of this system, particularly to the lessee, may be illustrated by the following example.

To the south of the Town of Cobalt there are two lots of approximately 40 acres each, the Silver Queen and the Cobalt Townsite properties. In 1906, when Cobalt properties were coming prominently before the public, the Silver Queen property was part of the holdings of the Hudson Bay Mining Company, while the Cobalt Townsite property belonged to the T. & N. O. Ry. These two properties lying side by side each had silver-bear-

*From report of the Mining Engineer of the T. & N. O. Ry. Commission