ore from the Silver King mine, there will be three smelting works in operation in West Kootenay, and we may, therefore, now consider that the smelting industry will, in a short time, be a most important factor in the development of the wealth of one of the most important mineral sections of this Province.—*Statistic News Advertiser.*

Mineral Shipments from Trail Creek, B.C.—From statistics furnished by the local Customs officials the following is the estimated amount and value of the shipments of gold, silver and copper ores shipped from the Trail Creek district for the fiscal year ending June 30th, 1895. Although for twelve months, yet almost the whole of the shipments have been made during the last five months:

Gold	20,510 ounces	$400,200.00
Silver	29,804 "	21,802.30
Copper	925,693 pounds	46,372.65
Total value		$468,374.95

A New Coal Calorimeter.—In a paper presented to the American Society of Mechanical Engineers at Detroit recently, Mr. R. C. Carpenter describes an instrument for determining the heating value of coals. In principle it is a large thermometer, the combustion taking place in the bulb and the heat being absorbed by the liquid in the bulb, the heat causing the liquid to rise in a glass tube extending upward outside. The fuel is placed in a dish in the bottom of the combustion chamber, and is fired by an electric current through a platinum wire, and oxygen is supplied through a tube. The discharge gases pass through a long coil of copper pipe.

The Down-Draught Furnace for Steam Boilers.—At the meeting of the American Society of Mechanical Engineers, Mr. W. H. Bryan, St. Louis, described the down-draught boiler furnace invented by M. C. Hawley, of St. Louis, which is said to have done more than any other mechanical device towards the solution of the smoke problem. In this furnace the fire burns downward, instead of upward, the coals being sustained upon grates which are water tubes connected with the water circulation of the boiler. The air enters the furnace above the fire, and passes down through it. Some of the coals drop down through the grate, and are burned upon a grate below with an upward draught, the gases from both the fires passing onward together to impart their heat to the boiler. It is said that 90 per cent. of the furnace work is usually done by the upper fire with the down draught.

Welding Nickel Steel.—H. P. McIntosh, the secretary of the Canadian Copper Company of Cleveland, has this to say regarding some trials the company has made recently in welding nickel steel: In each trial two pieces, each one inch square by six inches, were welded together with a lap weld, with the following results:—No. 1.—Samples containing nickel 2.05 per cent. and carbon 0.22 per cent. cut like soft steel, welded perfectly, with no sign of weld showing; bent twice at right angles at the weld when hot, weld did not open nor was any crack noted; bent at right angles when cold, failed to show any crack at weld. No. 2.—Samples containing nickel 3.25 per cent. and carbon 0.16 per cent. worked exactly like No. 1, same tests, no crack seen; welded perfectly. No. 3.—Samples containing nickel 3.40 per cent. and carbon 0.31 per cent. cut a trifle harder, also hammered like a harder steel, welded perfectly, bent hot and cold like No. 1, showed no crack, weld cannot be seen. No. 4.—Samples containing nickel 2.62 per cent. and carbon 0.19 per cent. worked exactly like Nos. 1 and 2, same tests did not show any weakness at weld. No. 5.—Samples containing nickel 3.20 per cent. and carbon 0.54 per cent. worked a little harder, but gave perfect, solid weld; no cracks on bending hot and cold. No. 6.—Samples containing nickel 3.10 per cent. and carbon 0.96 per cent. worked harder, *i.e.*, like a tool steel, welded perfectly, no cracks on bending hot and cold. No. 7.—Samples containing nickel 4.95 per cent. and carbon 0.51 per cent. worked like No. 5, not so hard as No. 6, perfect weld, no cracks on bending. In general, the percentage of nickel does not affect the welding power at all. The steel must be treated like any other steel, using more care with the higher carbon.

The Great Water Wheels at Niagara.—The three wheels now set and completed for the Niagara Falls Power Company were designed by Faesch and Piccard, of Geneva, Switzerland, and were built under contract with the I. P. Morris Company, of Philadelphia. They consist of two Fourneyron turbines, one being set inverted and vertically over the other, so as to neutralize weight on the step or bearing. Each of these twin wheels is, moreover, made three stories high or deep, and the speed gate consists of a cylindrical rim, moving up and down on the outside of each wheel. To further neutralize weight on the upper bearing of the shaft, the water from the supply tube is allowed to pass through the disc of the upper guide wheels, and to act vertically upward upon the disc of the upper turbine wheel. The disc of the lower guide wheel is, on the other hand, solid, and the weight of water upon it is supported by three inclined rods passing through it and the wheel casing. These wheels will discharge 430 cubic feet per second, and, acting under 136 ft. of fall from the surface of the upper water to the centre between the upper and lower wheels, will make 250 revolutions per minute; at 75 per cent. efficiency they will give 5,000-horse power. The turbine wheels are made of bronze, the rim and buckets forming a single casting. The shaft is a steel tube 38 in. diameter, except at points where it passes the journal bearings or guides, at which it is 11 in. in diameter and solid. A heavy flywheel was originally designed to be mounted on this shaft, to enable the governor the better to control the speed of the wheel, but has been replaced by the revolving field of the dynamo.—*Cassier's Magazine.*

Limitation of Explosives.—Mr. Frank Clowes, Professor of Chemistry in the University College, Nottingham, read, before a recent meeeting of the Institution of Mining Engineers, an interesting paper on "The limtiing explosive mixtures of various combustable gases with air," and gave as the conclusions of his experiments —1. When mixed with atmospheric air at ordinary atmospheric pressures different combustible gases show different limiting explosive proportions. 2. The range between the lower and upper explosive mixtures is least in the case of methane or fire-damp. The range is widest in the case of hydrogen, but carbonic oxide shows an almost equally wide range. The limits in the case of water gas are widely separated; with coal gas the range of explosibility is less. 3. The tendency to explode is greater when the mixture is fired from below than when it is fired from above. Hence the lower-limit mixture contains less gas, and the upper-limit contains more gas, when the mixture is fired below than when it is fired above. 4. Since the risk of explosion occurring when a gas is mixed in unknown proportion with air is diminished as the limits of explosibility approach one another, the gases which were employed in these experiments may be placed in the following order of increasing danger:—Marsh gas, ethylene, coal gas, water gas, carbonic oxide, hydrogen. 5. In every case the danger of an explosion resulting from a naked flame being brought into contact with a mixture of unknown composition is greatest when the flame is applied to the bottom of the mixture than when it is applied to the top.

This paper was followed by another from Mr. Clowes, on "The change of Composition Produced in Air by Flames and by Respiration." As the result of experiments, he stated that the proportion of oxygen left in the residual air corresponded to that contained in the artificially produced athmosphere which had previously been found to extinguish each flame. Further, that the composition of the extinctive atmospheres left by the common wick-fed flames was very similar, and closely corresponded with the composition of expired air. A coal-gas flame, however, was able to reduce the proportion of oxygen in the air to a considerably greater extent than ordinary, wick-fed flames; while the hydrogen flame diminished the oxygen in the air to about one-third the amount left by these flames, and to one-half that left by the coal-gas flame. The combustion of fire-damp (marsh gas) produced an effect on the composition of the air which was very similar to that of the wick-fed flames. The results obtained by Dr. Haldane on the respirability of atmospheres of various composition prove that the air in which the wick-fed flames or the flames of fire-damp had burnt until they became extinguished was respirable not only with safety, but even without inconvenience. This was also true of air which has been once breathed, and which extinguishes ordinary wick-fed flames. Dr. Haldane further maintains that no permanent injury to health would result from breathing such atomspheres for some time. It follows that the extinction of the flame of a candle or a safety-lamp in air did not prove such air to be unfit for respiration, and that accorded with the experience of many practical miners.