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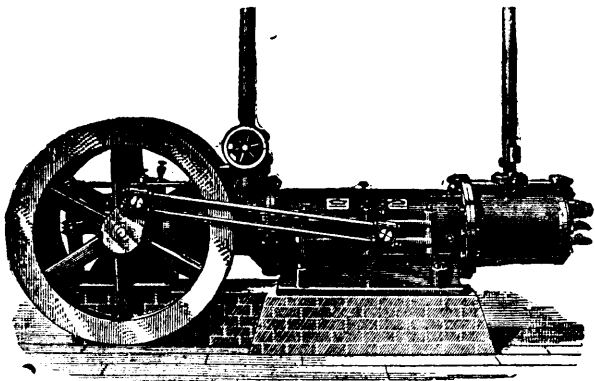
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 Established 1882

Vol. XV.—No 7

MONTREAL—OTTAWA—HALIFAX.

JULY, 1896.

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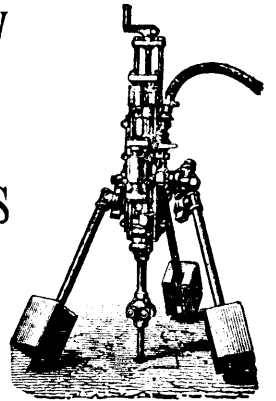


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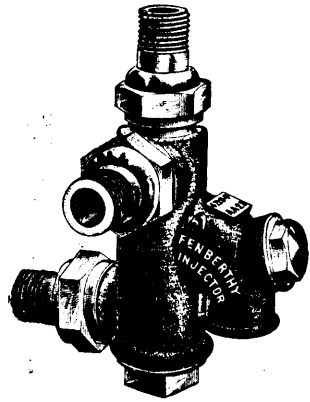
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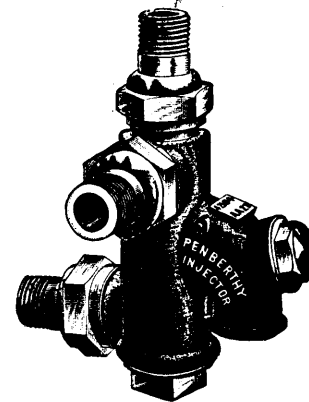
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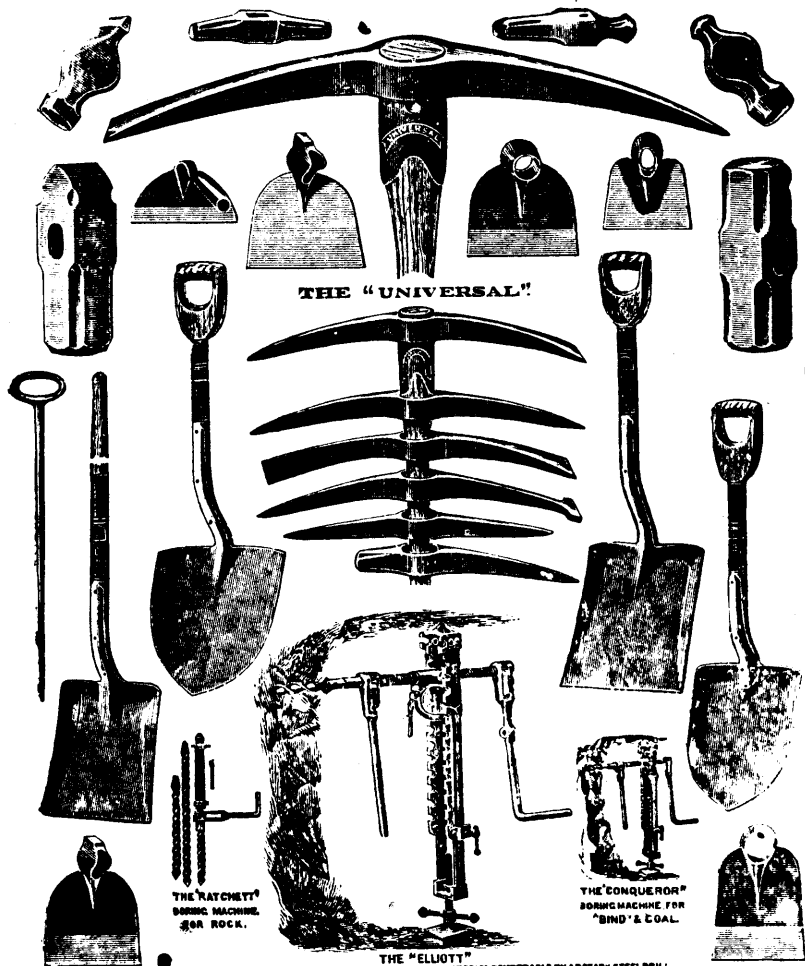
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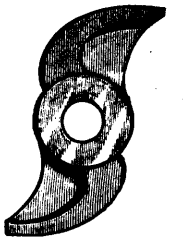
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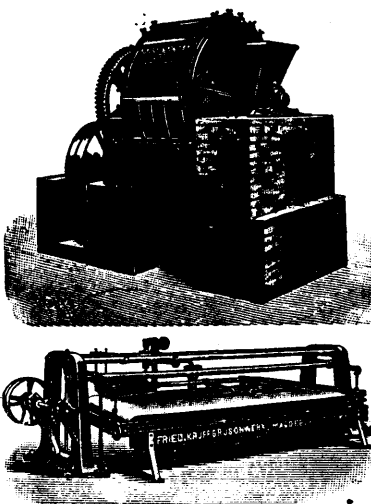
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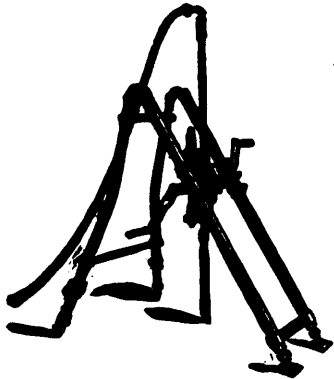
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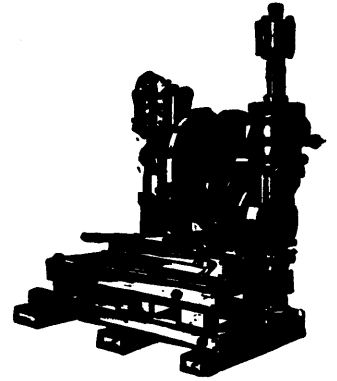
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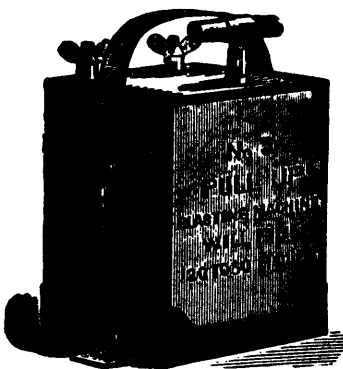
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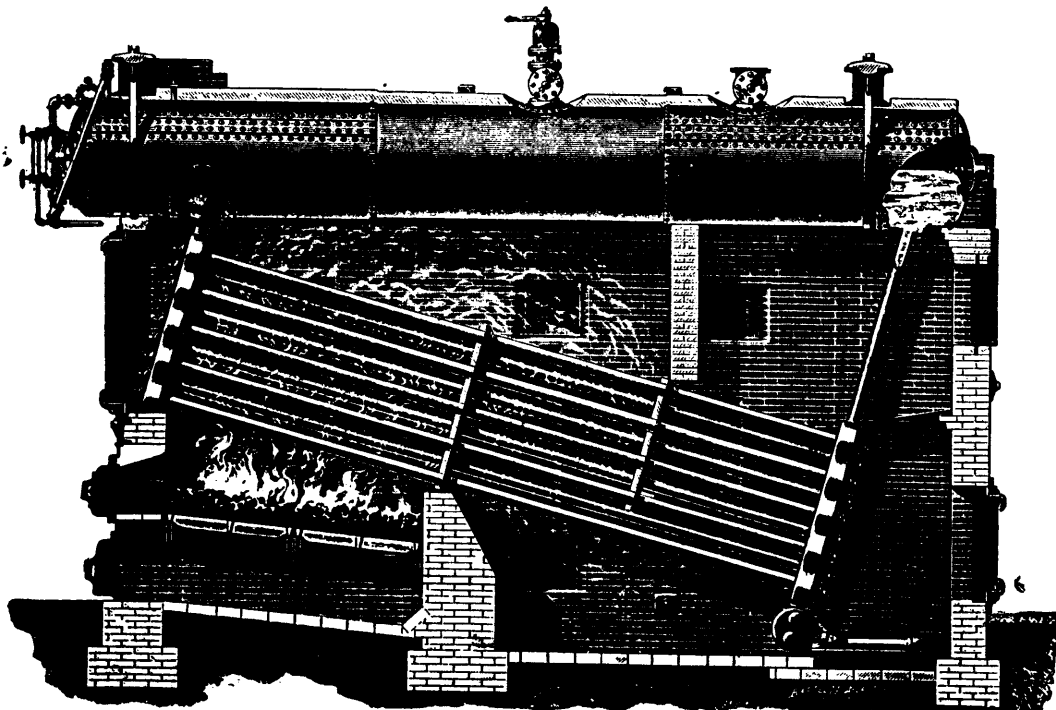
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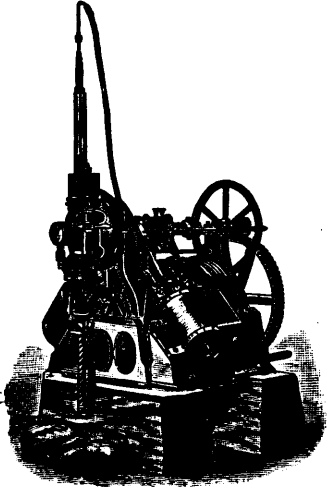
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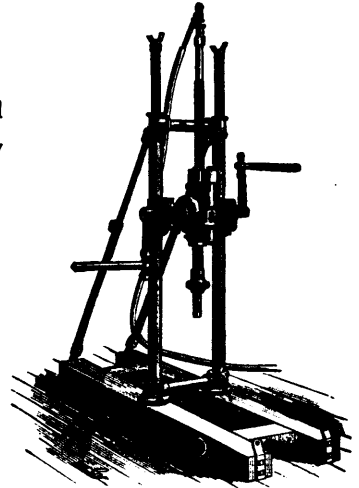
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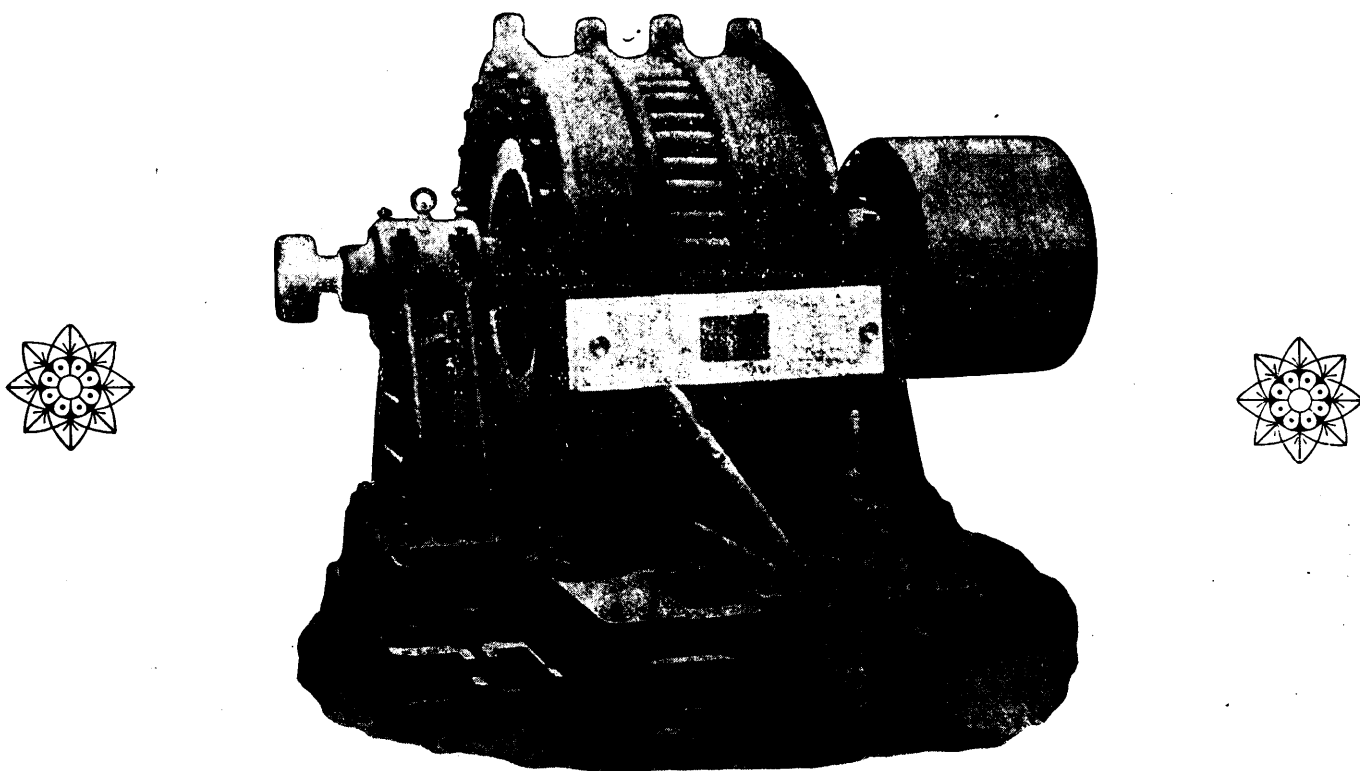
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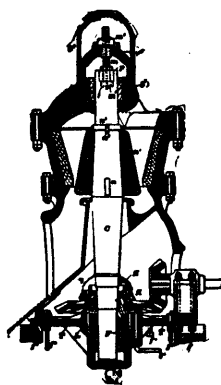
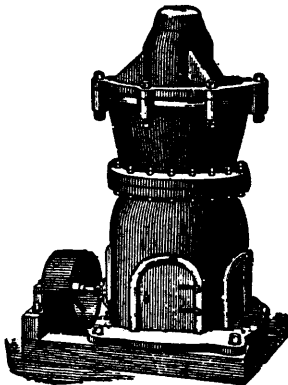
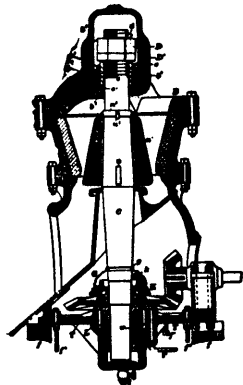
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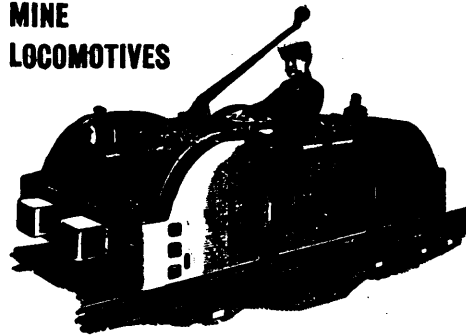
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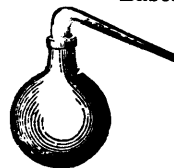
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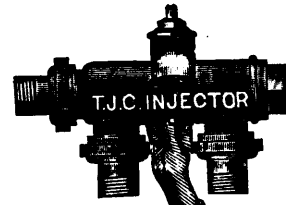
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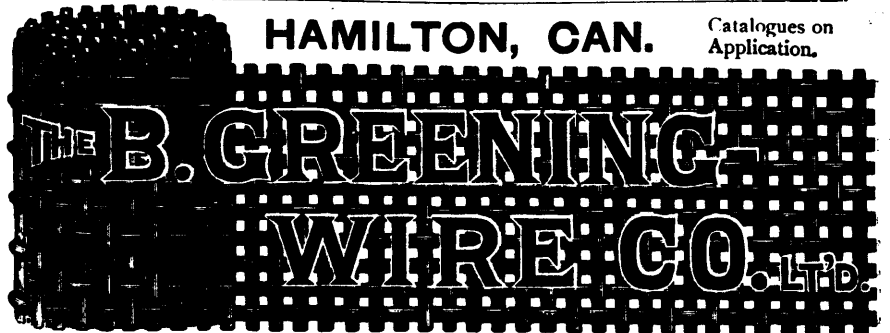
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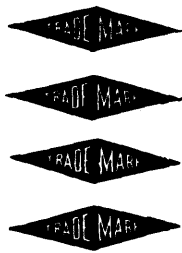
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B. T. A. BELL, Editor.

Published Monthly.

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VOL. XV., No 7

JULY, 1896.

VOL. XV., No. 7

## The Trail Creek District, B.C.

From our Rossland Correspondent.

In the year 1894 the value of the total output of the mines of the Trail Creek camp amounted to one hundred and twenty-five thousand dollars. This figure was increased to one million and a quarter last year. Such a wonderful increase in so short a time, and at a time too when the lack of anything like adequate transportation facilities for the shipment of ore, speaks more eloquently than words of the wonderful richness of the mines.

Six miles north-west of the confluence of the Pend d'Oreille and Columbia rivers, an average-sized mountain stream called "Trail" Creek, (from which the district takes its name) flows into the latter waterway. This creek was well known to placer miners in the late sixties, as the celebrated Dewdney Trail, which was built to connect Hope, on the Pacific coast, with the then fabulously rich placer diggings on the Wild Horse creek in East Kootenay. This trail follows the course of the creek from its mouth to its source—about ten miles. However, it is not definitely known whether these early pioneers ever found evidences of the vastness and richness of the present Trail Creek camp or not, the first authentic account of the value of the ore being the disclosures made by Ben Thrasher and a party of prospectors in the summer of 1887. The following summer but one, a French Canadian by the name of Bordeau made the first discovery and located a claim called the Lily May, of which more will be said anon, as the claim is now under bond for \$25,000. Bordeau worked the claim during that winter, and found much to encourage him. In July, 1890, Joseph Moris and Joseph Bourgeois, two men who had been in Bordeau's employ during the previous winter, started on a prospecting trip in the direction of Red Mountain, and there located the Le Roi, Centre Star, War Eagle, Iron Mask and Virginia claims, staking in oneday a group of five claims that to-day could not be bought for ten millions of dollars.

At that time, Nelson, situated on the outlet of Kootenay Lake, and distant some sixty miles, was the only recording office in the district. While there having their claims recorded, and the ore assayed, they met E. S. Topping, and, under the law, being unable to hold two claims on the same ledge, and as the LeRoi, Centre Star, and Idaho appeared to be located on the same ledge, they gave Topping his choice of the three in consideration of paying the recording fees on the group. Topping chose the LeRoi, as the ore from this claim showed on assay a slightly better gold value than any of the others.

Topping returned, carefully sampled the vein, and, armed with splendid samples of ore and assay certificates, he then went to Spokane, and succeeded in inducing some western mining-men, with Mr. Oliver Durant, a mining-man of many years practical experience, to take hold. A bond of \$16,000 was taken on sixteen-thirtieths of the mine. Subsequently, Mr. Durant sold his interest in the Le Roi, and bonded the Centre Star. For five years Mr. Durant has continued to put his money

in the camp, and up to date has not received a cent in return, though the day is not far distant when the Centre Star will re-imburse him for all his labor. Mr. Durant is certainly the pioneer and father of the camp. In the winter of 1890-91, the LeRoi Company had a carload of ore packed on mules' back to the Columbia river, and from thence shipped to the smelter at Butte, Montana. This ore averaged \$86.40 in gold and copper to the ton. However, regular shipments did not commence until three years later, as the cost of packing and transportation was very excessive. In the interim a great deal of desultory development work was being done on the Le Roi, War Eagle, Centre Star and Josie claims.

Though the camp is comparatively new, and has only been known to the outside world for the past year, it is easily accessible from the main lines of any of the great trans-continental railway systems which girt the continent. Leaving the C. P. R. at Revelstoke, a pleasant trip down the Columbia river on one of the splendid steamers of the Columbia and Kootenay Navigation Co. lands one at Trail. On this trip the grandest and most rugged mountain scenery in America can be most comfortably enjoyed, and the meanderings and sinuosities of the great Columbia, the commercial artery of the West Kootenay district, among the snow-clad mountains, are a sight never to be forgotten. Trail on the Columbia, by the road of the Columbia river and Western Railway, is ten miles from Rossland, which is virtually situated at the "dumps" of the mines. A five hours' journey from Spokane, in the State of Washington, which is on the main line of the Northern Pacific, Union Pacific and Great Northern systems, lands the passenger at Northport. At Northport streamers meet all trains for Trail.

### ROSSLAND.

Rossland is to the Trail Creek mines what Johannesburg is to the Rand, and an idea may be gathered of its importance from the fact that in less than a year it grew from a straggling hamlet of some dozen log-cabins to a prosperous town of nearly 4,000 inhabitants. The town proper is situated on a succession of "benches" at the base of Red Mountain. Rossland is a substantial and prosperous place. It has an incandescent electric light plant, a first-class waterworks system, while its stores and buildings are second to none in Southern Kootenay. Though the town has sprung up in a night, as it were, Rossland is no "mushroom" town, redolent of and reeking with all the vices and moral pitfalls familiar to and typical of (according to Bret Harte) the latest mining camp in the wild and woolly west. Quite the contrary, Rossland is noted for its quietness and respect for the laws. John Kirkup, recorder, has been the constable, recorder, gaoler, and, in fact, a veritable Poo-Bah. He is respected far and near, and exercises a wonderful influence over the motley crowd, who necessarily make up the population of the new mining camp. In Rossland there is no legalized gambling, no "gun plays," no variety theatres, and the usual complement of dance-halls find no place here. Drinking there is, of course, but little compared with that usually going on in a new town, where the excitement of making money generally keeps the human pulse at fever heat. All lines



of business are well represented in the new mining camp, the supply of labor both in the town and at the mines has at all times been equal to the demand.

#### FORMATION OF THE DISTRICT.

The writer is indebted to Mr. J. D. Sword, M.E., of Rossland, for the following remarks on the mineralogical and geological formation of the district:—

"Up to the present little or no geological or mineralogical exploration has been done, and the eruptive rocks which form the country rock of the district have not been identified with any particular epoch, and no sedimentary rocks, altered or otherwise, have been noticed within a considerable distance from the camp. The eruptives which form the country rocks of the camp are, however, very similar to those of some parts of eastern Canada, notably Sudbury. The prevailing rock is a greenstone in all its various refinements of nomenclature, but mostly diorite, syenite, porphyry-diorite of all shades and textures, owing to its constituents, viz, feldspar, pyroxene and hornblende being variously proportioned. At a distance from the veins, the country rock appears to have a lighter color and a coarser texture. The whole of the country rocks have a jointage more or less distinct. The lines of jointage or cleavage appear to be more numerous near a vein, and the rocks there have a short, sharp, blocky appearance, which does not obtain so much as at a distance from the ledges. A large portion of the country rock, particularly near the veins, on a fracture, shows iron in small flecks, in the form of magnetic pyrites, with a few specks of chalcopyrite. Several eruptive dykes, very similar to the adjacent rocks, though lighter in color, owing to excess of feldspar, which traverse different sections of the country. The general contour of the country is by no means abrupt, but the hills appear to have rounded off by nature, and luxuriant timber and undergrowth cover the greater part of it. Winter does not set in till late in the year, and although there is an almost continual downfall of snow the winter is mild, and there is but a very short period of excessive cold, such as we experience in eastern Canada. The general strike of the veins is east and west, and their dip near the surface between 60 and 70 degrees, though on sinking on some of them, notably the Le Roi, the veins become almost perpendicular."

#### THE VEINS AND ORE.

In all places these veins are strong, true and very easily traceable, throwing considerable "float" in the shape of capping mixed with ore. They vary in width from 3 to 50 ft.; in some places veins as wide as 200 ft. have been found, but they are unusual. These veins are, as a rule, heavily covered with a strong greenstone capping, impregnated to a greater or less degree with pyritic and white iron. The lines of jointage of the "cap" rock are usually filled with a decomposed mass of red oxide of iron, very dark in color. The ore is generally found under this capping at a depth of a few feet. The general opinion among mining engineers is that these veins are true fissures. The ore is a massive mixture of copper and iron sulphide, consisting of pyrite, a chalcopyrite, pyrrotite, arseno-pyrite, and mispickel, with a quartz and calcspar gangue. This ore is not often crystallized, but is usually in a solid amorphous mass. It carries 1 to 3 oz. in gold, 3 to 10 per cent. copper, and a small varying amount of silver, usually less than 10 oz. to the ton. The ore occurs in chutes, short, but with an unusual frequency and width, though one continuous solid chute of ore 147 ft. in length has been found in the Centre Star mine. This ore generally, though not always, lies on the hanging wall, and the absence of any "talc" seam or "gouge" between the walls and the vein matter has been remarked. Although numerous experiments have been made, as yet it is a debatable question, in what combination the greatest gold value occurs, but assayers who have had considerable experience with the ore, aver that the chalcopyrite and arseno-pyrite carry the most gold.

Trail Creek ore is especially desirable in silver-lead smelting, as it carries a heavy excess of iron, about 25 per cent., thus making it a very valu-

able fluxing agent in the smelting of "dry" or silicious silver ores. For this reason the smelting charges on the ore are generally low, about \$5 to the ton. The ore bodies in the shipping generally average about 10 ft. in width, though in some places, notably in the Le Roi and Centre Star, lenticular-shaped bodies of pay ore 30 ft. wide have been uncovered.

#### NATURAL SUB-DIVISIONS.

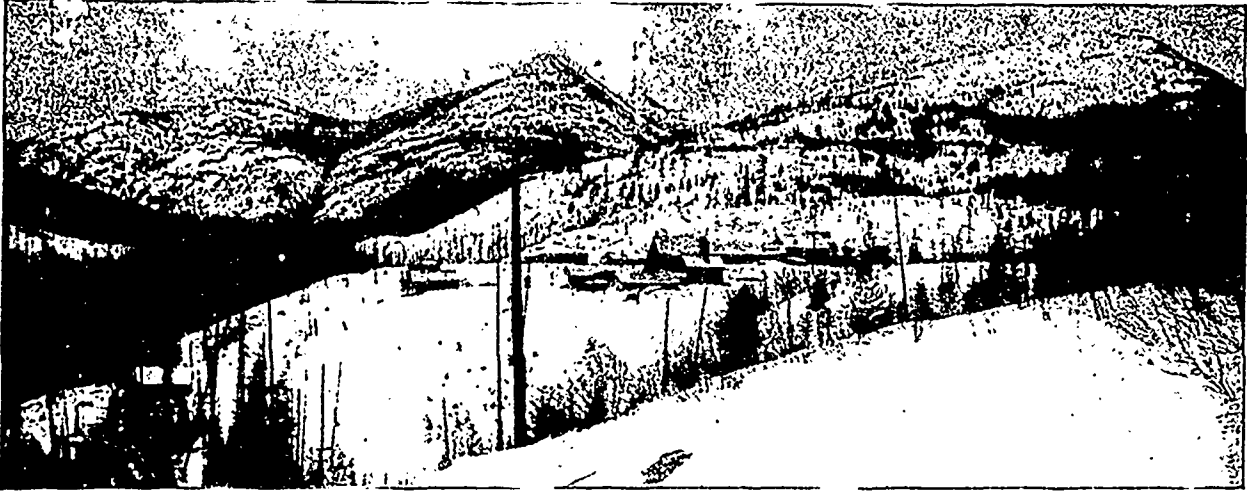
Geographically, the camp proper is divided into two parts, the claims situated on Red, Monte Cristo and Columbia mountains on the north side of Trail Creek, and those situated on Lake Lookout and Deer Park mountains on the south side of Trail Creek. For distinction's sake those claims situated to the south of the creek are termed the "South Belt".

Development work during the past winter and early spring has proved the existence of a very valuable area of mineral country which extends north as far as Rock creek, five miles. Not enough development has as yet been done, to accurately determine the exact extent and value of this region. Remarks of the same character apply to many claims situated on the range of mountains west of Sheep creek, upon which development has been going on steadily all winter. Development work, principally in the case of the Jumbo, has proved the existence of wonderful bodies of auriferous sulphide ore. These claims do not really belong to the Trail Creek district, but they are all directly tributary to Rossland, and all ore will go via this town to the Smelter.

The camp proper, *i.e.* that part lying to the north of Trail Creek, is traversed nearly on east and west lines, by four main parallel veins. They are known as the Ontario, Cliff, War Eagle and Le Roi veins. On the Le Roi vein, starting to the east are situated the Copper Jack, Kootenay, Columbia, Iron Colt, Enterprise, Idaho, Centre Star, Le Roi and Black Bear claims. The North Star, Iron Horse, Virginia, Iron Mask, War Eagle, Pilgrim, Number One and Gertrude lie on the War Eagle vein. The Jumbo, Nevada, Mountain View, St Elmo, Con St. Elmo, Cliff, Eddie J. Monte Cristo and Georgia, are supposed to be on the same lead—supposed to be—because not enough continuous development work has as yet been done to accurately determine the true course and trend of the vein. There is still another large east and west vein farther north that runs through the Ontario, but the camp is yet too much in its infancy to speak authoritatively on this vein. There are other veins, distinct from these, on which the Josie, Golden Queen, Grant, Red Mountain, City of Spokane, Con. West Le Roi, and Josie, Eldorado, Commander, Great Western, Evening Star, Nickel Plate and Colonna are situated. The South belt was practically an unknown quantity until last summer, when some large bodies of high-grade auriferous ore were discovered. As far as known at present there is one main vein in this section, on which are situated The Sovereign, Crown Point, Iron Queen, Oriental, Celtic Queen, R. E. Lee, Maid of Erin, Gopher and Homestake claims. As is the case on the north side of the creek there are a number of claims with meritorious showings that have strong veins, but their continuity has not been traced so far. The exact confines of this great mineral belt are not known, but it is generally supposed to be ten miles square extending westward from the Columbia river. The claims on the west bank of Sheep Creek are all developing very nicely. A curious feature in this section is the vein of free milling quartz found on the O. K. and I. X. L. Some of the finest specimens of gold quartz in the world have been taken from these claims. There is a five stamp mill in constant operation on the property. A mill of ten stamps has been ordered. The concentrates from this property will average nearly \$300 per ton.

#### PROGRESS OF A YEAR.

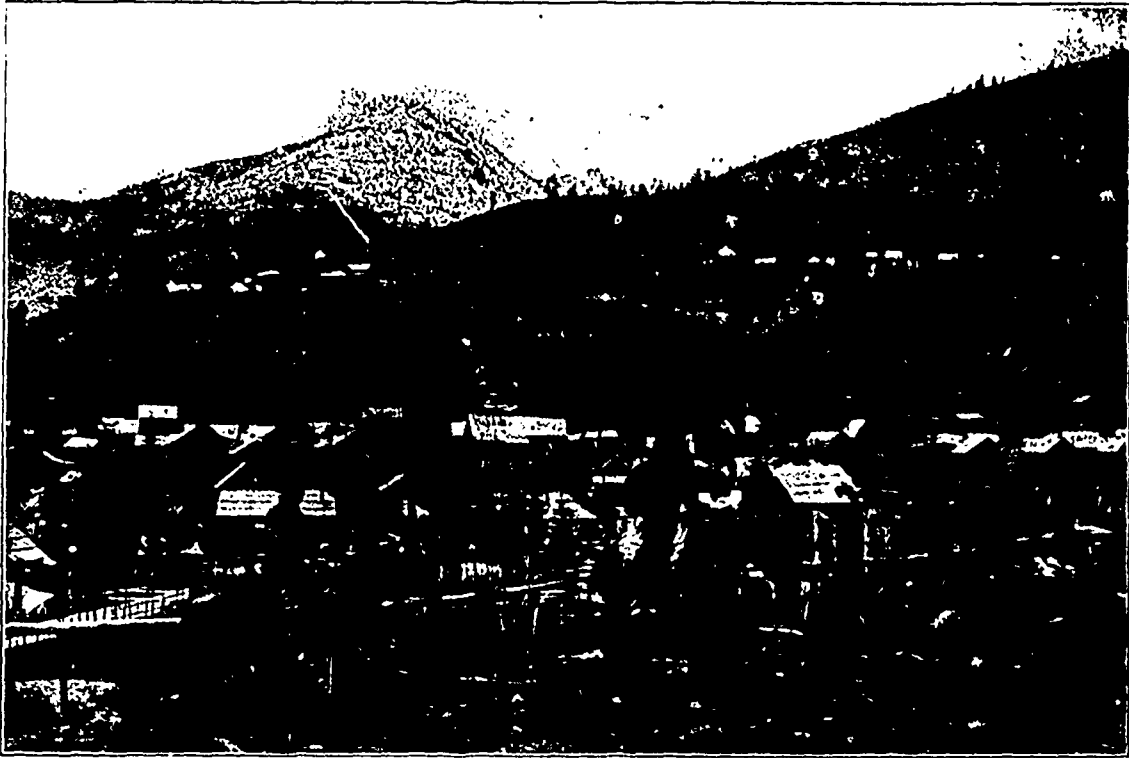
The best criterion of the advance of a new camp is the statement of the ore shipped and its value, although it is hardly a better indication of the feeling of confidence manifested by capital and mining men of experience, in the permanency of its ore bodies, than the installation of heavy mining machinery and the construction of adequate lines of transport-



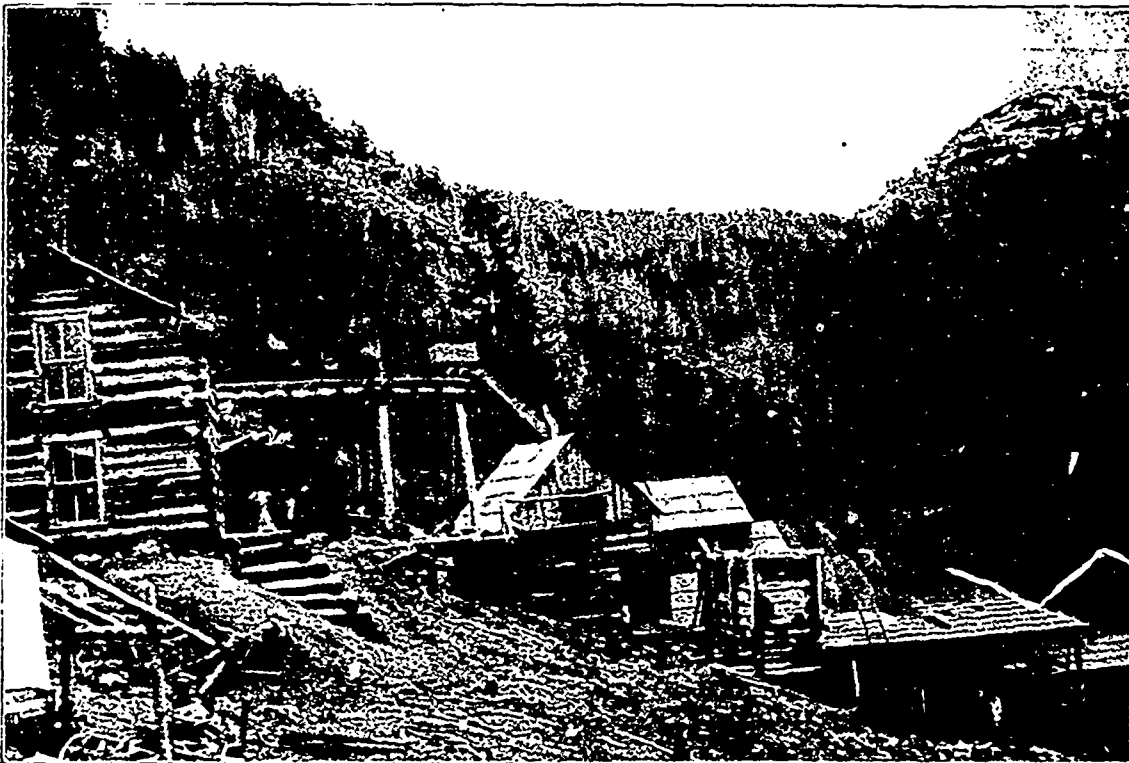
View of the Rossland Mining Camp, B. C., from a Photo taken in 1894.



Rossland, B. C., in 1895.



Cabins on Disputed Land North of Rosslund.



The O. K. Mine.

tation to handle the output of its mines. One year ago, there were but two small hoists, a compressor and two boilers in the camp. Since that time six mines have been fully equipped with air-compressing plants, and machinery has been ordered for as many more. In the matter of transportation the advance has been no less phenomenal. Already one railroad into the camp is in operation; another will be completed in three months. This gives however, a very inadequate idea of the possibilities of the Trail Creek quartz mines.

#### THE MINES.

The greatest mine in the Trail Creek camp, both on account of the size of its ore bodies, and in the number and amount of dividends paid, is the "Le Roi". This property, with the Black Bear, which adjoins it on the west, both situated on one of the successions of benches of Red Mountain, is said by the well known London expert, Mr E Pritchard, to have the most wonderful showing of gold ore in the world. It is owned by a syndicate of American lawyers, nearly all of whom are residents of Spokane. The manner in which this magnificent property has been opened up, its rapid progress from the "prospect" class into a dividend-paying mine, reads more like a page from the stories of fiction rather than solemn, sober fact. The lucky stock-holders in this property deserve their good fortune, for they continued to sink money in development work through many a dark day when neither ore nor dividends were in sight.

The property is opened by a shaft on the Le Roi, situated nearly in the centre of the claim. This shaft is now down approximately four hundred and seventy-five feet, following the dip of the vein, and levels run both ways at the depth of fifty, one hundred and fifty, two hundred and fifty, three hundred, three hundred and fifty and four hundred and thirty feet respectively, disclosed remarkable bodies of high grade ore. The mine did not give much promise until a depth of two hundred feet was obtained. From this point, however, to the bottom of the shaft the ore body has been widening, and the grade increasing until the Le Roi is now in a position to pay at least \$50,000 a month dividends. Probably more extensive development work has been done between the 300 and 350 foot levels than in any other portion of the mine. Stopes thirty-four feet wide, the full width of the solid ore body, are being carried right along. In the East drift, on the three hundred and fifty foot level, the diamond drill was put to work, boring to the north, and after penetrating twenty-six feet of barren rock a vein, or perhaps a deposit of sulphide ore, parallel to the main ore body, twenty-two feet in width was cut through. This ore averaged, on fire assay, \$57 in gold per ton. A curious feature in connection with the ore bodies of this mine was the silica attributes from the ore down to a depth of three hundred and fifty feet. This ore was essentially a chalcopyrite in a strong quartz gangue. This ore is some of the best that has been struck. Below this level the ore body straightens up, and the vein is almost perpendicular. When this change in the formation of the vein took place the quartz gangue left the ore, and the last one hundred feet shows a solid sulphide ore body. Conservative estimates of the output of this mine for the calendar year of 1896 are 45,000 tons of ore of an average value of \$40 per ton. The mine is under contract to deliver 37,500 tons of this ore a year to the Trail smelter. Since last October the mine has paid \$175,000 in dividends, and now with a market for their product, the owners declare that 50,000 dollars a month in dividends can easily be paid.

The mine is splendidly equipped with the latest improved mining machinery; there is one seven-drill compressor, one large Ingersoll hoisting engine in addition to a small hoist, a rock crusher, a diamond drill operated by electricity, one 100 h. p. boiler and one 80 h. p. boiler. In addition to this plant, the Le Roi Company have closed a contract with Eastern Machinery manufacturers for one cross compound condensing Corliss air compressor of about four hundred and fifty indicated horse power. This machine is to be fitted with the latest type of mechanical air valves, and will be used for pumping, hoisting, and to

operate forty drills in the Le Roi mine. It is a fact worthy of note that this is the largest and most extensive air compressor plant ever built in the Dominion of Canada. An order has also been placed with the Ingersoll Rock Drill Co. of Canada, for three 125 h. p. boilers and one 20 ft. x 40 ft. direct acting winding engine.

#### WAR EAGLE.

This mine is situated six hundred feet to the north of the Le Roi mine on a parallel vein. Like many another great mine, the War Eagle has had a checkered career. Since it was staked six years ago, it has been bonded, thrown up, condemned, reopened and again thrown up. However, there was a mine in the War Eagle ground and it only took money and practical experience to find it. The company owning it is composed of Washington and Montana men. Up to this date this company has probably the most systematically developed mine in the camp. Pay ore has been found the whole length of the claim. The work consists of two shafts, both 112 ft. deep, which connect with the number one level. From this level to the surface over 12,000 tons of ore were extracted, the proceeds of which in addition to paying for the mine, for all development work, and for the usual and necessary costs of opening up a large property, has paid \$132,500 in dividends. Another tunnel 114 feet below number one has been driven and the famous ore chute found in the upper tunnel has been struck, and found to carry its strength and grade. Another dividend of \$25,000 has been declared from ore extracted from these works. An upraise connects these tunnels. The company are shipping but little ore at present, and no stoping is going on in the mine, as an option for one million dollars, expiring the 1st of August, has been granted to D. C. Corbin, President of the Spokane Falls and Northern Railroad, on this property, and it is almost a foregone conclusion that this option will be taken care of, as Mr. Corbin is extending his line from Northport to Rosslund. It is very problematical if this work would have been undertaken if he had not assured himself of the tonnage of this mine. The machinery consists of two 100 h. p. boilers, made by the Ingersoll Rock Drill Co. at Montreal, two hoisting engines, a 40 h. p. boiler and a complement of Ingersoll Sargent drills; a 20-drill Corliss air compressor furnishes the power.

#### JOSIE.

This mine, which adjoins the two former on the west, has a phenomenal showing. Though not quite a full-sized claim, the ground is intersected by three veins, all true and distinct. The main vein is traceable the entire length of the ground, and wherever it has been uncovered pay ore has been found. An adit tunnel has been driven 450 ft. on this vein and three distinct ore chutes have been uncovered.

Frank Loring, the owner of this property, says that there are twenty thousand tons of shipping ore actually in sight between this level and the surface. Stoppers will be put to work breaking down this ore as soon as the tramway is completed to the mine. At the mouth of this tunnel a shaft has been sunk for a distance of 70 ft. on the ore chute, and at the bottom it is fully 5 ft. in width; this shaft in future will be the main workings of the mine. One hundred and thirty feet to the north a parallel vein has been found and a shaft is now being sunk on a fine body of ore. This lead will also be worked from the main tunnel. Midway between these veins a small vein of exceptionally high grade ore was cut through. During the last year the Josie has shipped in the neighborhood of twenty-five hundred tons of ore of a gross value of \$140,000, which has paid for the installation of a fine power plant, as well as for all development work. The plant consists of a 7 drill Ingersoll compressor, an 80 h. p. boiler, in addition to an Ingersoll hoist and a Knowles sinking pump.

#### IRON MASK.

The Iron Mask adjoins the War Eagle on the east, and together with the Virginia was originally the property of the War Eagle Company. However, a separate corporation was formed to develop it. Undoubtedly the lead on this property is the great War Eagle lead, all developments

up to date tending to show a continuous vein. The owners say that some of the best ore that they have yet shipped from the Trail Creek camp has come from the Iron Mask shaft. This shaft is now down 100 ft., and shows a solid body of auriferous ore at the bottom. Drifts have been run each way, and are daily improving in appearance with each foot of work.

At the left of Centre Star creek a tunnel is being driven; this tunnel will constitute the main workings of both the Iron Mask and War Eagle mines before sinking will have to be resorted to. However, the company are now starting a large three-compartment vertical shaft at the mouth of this tunnel and are preparing to put in sinking machinery. The machinery that furnishes power for the War Eagle performs a like service to the Iron Mask.

At present the property is under bond to D. C. Corbin for \$500,000 cash.

#### CENTRE STAR.

This property adjoins the LeRoi on the east, and has the best body of shipping ore in the Trail Creek camp at the present writing. It was bonded and paid for by Mr. Oliver Durant, for Durant & Tarbet, April, 1891, but the grade of the ore not being as high as the War Eagle and Le Roi, shipments were impossible. However, machinery has been installed and a vast amount of stoping ground has been opened up. The mine is worked by a tunnel which is now in nearly 900 ft. Five chutes of ore have been uncovered, and one chute 147 ft. in length, and, where crosscut, 20 ft. wide, proves the Centre Star to be in the "bonanza" class. At a distance in, of 400 ft., connections with the surface were made, and about 800 tons of ore were extracted in this work. At this point in the mine crosscuts have been run, both to the north and south, and four more distinct and separate veins have been uncovered, but as yet have not been followed for any great distance, and their real merits cannot be truthfully spoken of. The owners of this property are wealthy men, and although they have almost 10,000 tons of shipping ore on the dump they have not shipped a pound, nor has a pound of ore been stoped in the mine. They prefer to await the completion of competitive roads into the camp, and thereby get a nominal rate to the smelters. They also say that if satisfactory rates are unobtainable they will erect a smelter of 200 tons daily capacity on the Idaho ground, which also joins and belongs to them. The machinery at this mine consists of a 7-drill Ingersoll compressor and an 80 h. p. boiler. A conservative estimate of the holdings of the Centre Star Company places their value at \$4,000,000.00.

#### POOR MAN.

The Poor Man is a triangular fraction between the War Eagle, Josie and Le Roi mines, and contains the small area of six acres. However, it has a good strong lead, which was opened up by means of a shaft and a tunnel. The shaft is down 80 ft. now, and shows about 3 ft. of solid ore of a \$40.00 grade. About 300 tons of ore of this quality have been shipped, and it is presumed that the company will soon pay a dividend.

#### COLUMBIA AND KOOTENAY.

These mines, the property of the Trail Mining Company, a Chicago concern, lie respectively on the apex on the east slope of Columbia mountain, and join one another. Last summer three tunnels, aggregating in all four hundred feet of work, and about a hundred and fifty feet of shafting have disclosed an immense body of arsenical iron ore. Shipments were made from the Columbia and gave returns of \$51.20 in gold per ton. This year a waggon road to connect with the Trail Creek tramway has been built to the mines, and under the supervision of Mr. Martin King, the general manager of the company, a 30-drill cross Corliss piston inlet air compressor is being put in on the property. Three 100 h. p. Ingersoll boilers will furnish the power. This plant is partly up and will be in operation by the 1st of August. The company, financially, is a strong one and will develop the property to its fullest extent.

#### JUMBO.

A year ago to-day the mineral belt was not supposed to extend farther west than Red Mountain; however, development work during the past winter in the shape of a crosscut tunnel on the Jumbo proved the existence of the widest body of sulphide ore in the camp. The tunnel cuts the ore body diagonally for sixty feet, and conservative mining-men say that the Jumbo mine has forty feet of clean ore between walls, over half of which will pay to ship at the present exorbitant rates of waggon transportation. A good strike has just been made one hundred feet below number one tunnel, in blasting for a tunnel site, pay ore being uncovered at the very grass-roots. The owners of the Jumbo have built a waggon road to connect the mine with Rossland and will install a power plant immediately. The mine is admirably situated and can be worked at a minimum cost.

#### CLIFF.

For the past three years the owners of the Cliff have been systematically developing this property, and have succeeded, by means of about a thousand feet of work, in opening up one of the largest bodies of copper sulphide in the Northwest. The ore at this mine is not of as good grade as that at the War Eagle and Le Roi. However, about three hundred tons of ore, trial shipments, have been made, which have determined that the property can be mined at a fair profit. A two-hill compressor has just been installed on the property for prospecting. One drill will be utilized in a long cross-cut tunnel, which will give a vertical depth of about five hundred feet on the property.

#### NICKEL PLATE.

This property, belonging to A. W. McCune, of Salt Lake City, joins the Centre Star on the south and is a mine of no ordinary magnitude. The development work consists of a shaft one hundred and sixty feet in depth, two drifts one hundred feet long, and a cross-cut two hundred feet long. The ore in this mine is principally a pyrrhotite, and from the only ore shipped yielded \$92.00 per ton in gold. A rich strike has just been made in a drift from the north cross-cut, where a vein not found on the surface has been caught. The ore in this drift is six feet wide. The owners will put in a first-class compressor and hoist in the near future. Already about six hundred tons of high-grade ore are on the dump.

#### O. K.

In an article of this description, the O. K., situated two miles east of Rossland on Spokane mountain, deserves more than passing notice. It has the distinction of being the only free-milling quartz property in the great army of sulphide mines which surround it. For four years gold quartz has been taken from this property, a five-stamp mill has been kept running continuously, and monthly the O. K. has turned out a substantial brick, thereby adding its quota of wealth to the mining output of southern Kootenay. The mine was purchased last fall by Joseph L. Warner in the interest of outside capital and has been stocked. Under the skilful supervision of Mr. Warner the property has improved wonderfully, and is making a mine of magnificent proportions. It is situated on a very steep hill and is opened by means of tunnels eighty feet apart. In tunnel No. II there is a solid body of free-milling ore ten feet wide, all of which can be run through the mill and yield a handsome profit. The company will declare their first dividend in the course of a few weeks. The Jenckes Machine Co., of Sherbrooke, Que. are supplying the mine with a 10-stamp mill of improved pattern, and vaners of the Woodbury manufacture are being installed with the mill to catch sulphurets. An order has also been placed for an air compressor and drills.

#### CROWN POINT.

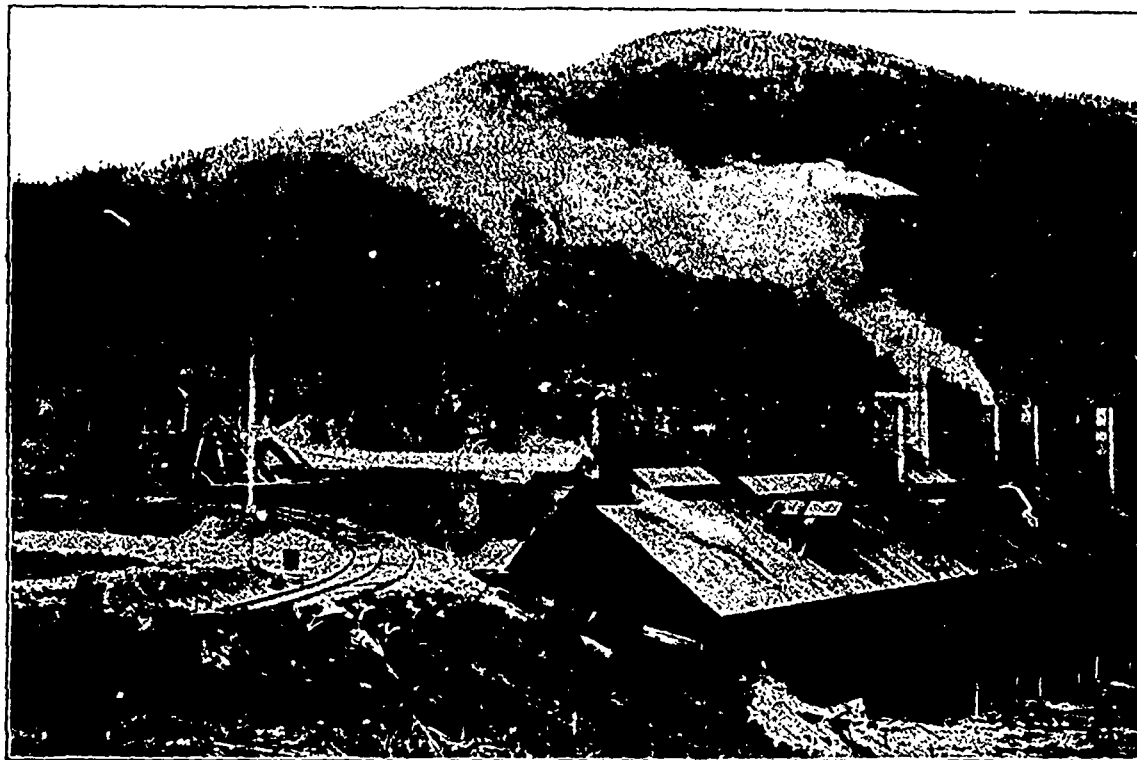
Two miles to the south-east of Rossland lies the Crown Point, famous for its large bodies of high-grade arsenical iron ore. A shaft has been sunk for a distance of one hundred and forty feet on the vein, and cross-cuts run to fully determine the exact value of this wonderful property. Drifts from the sixty-five foot level are in ore. In the prosecu-



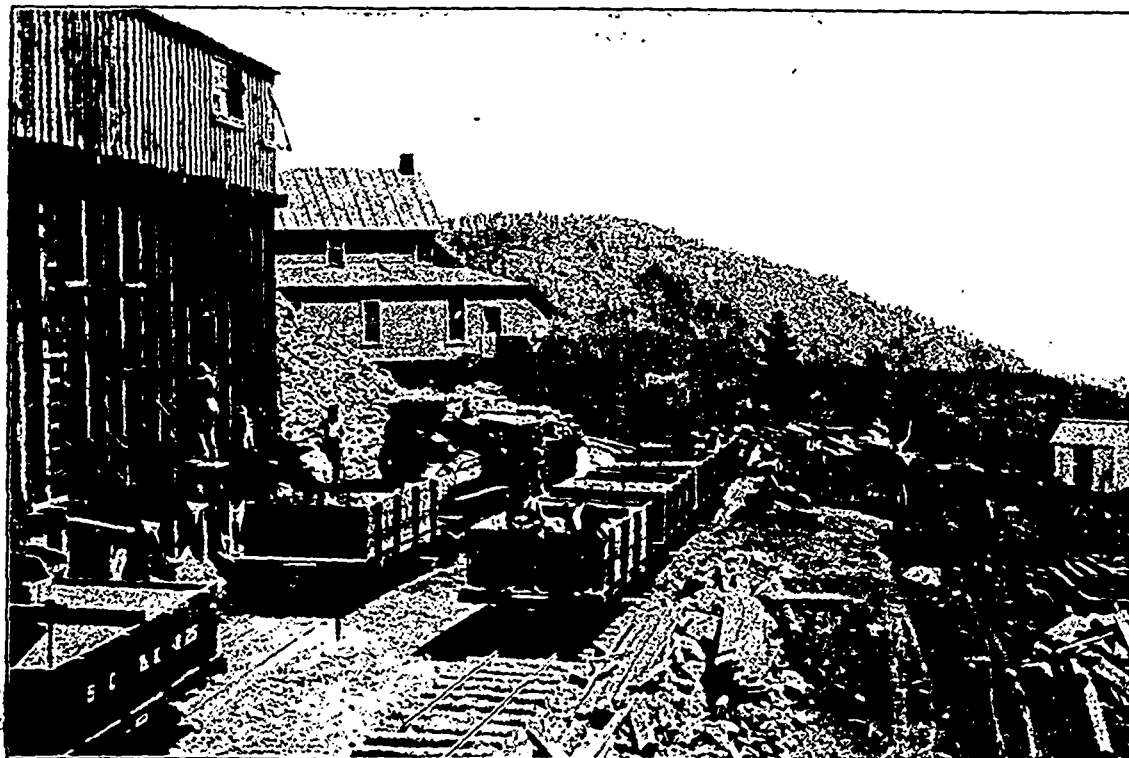
Miners at Jumbo Mine.



The First Mining in the Trail Creek District. Tunnel in the "Lily May."



Trail Smelter--showing Sampling Works and Furnace Building.



The First Train being loaded with Ore at the LeRoi Mine.

tion of this work fourteen hundred tons of ore have been extracted, and are lying on the dump awaiting the completion of a waggon road between the mine and the tramway. The owners, who by the way are the locators of the property, are now engaged in driving a crosscut tunnel that will tap the ore chute found in the shaft at a depth of 215 feet. This tunnel when completed will form the main workings of the mine. There is a strong lead running through this section of the camp, and should this tunnel encounter ore as expected, such claims as the Iron Queen, Wolverine, Tiger and Spotted Tail should prove bonanzas of the first order.

#### MAY FLOWER.

Occasionally there is lucky mining, as the owners of the May Flower found out when the graders for the Trail Creek tramway uncovered a three foot chute of \$90 ore. Float from this vein had been found last summer, but the vein being heavily capped was never located. To-day the owners of the May Flower have a force of men at work driving a tunnel on this body of ore, and the showing in the breast is all that could be desired. The mouth of the tunnel is right at the track of the Trail Creek tramway, thus facilitating the hauling of supplies and the shipping of ore. Returns from two car-loads of ore shipped give an average value of \$90 per ton. The vein has been stripped for two hundred feet and has been found strong and true. The May Flower may safely be considered a mine.

#### PROSPECTS THAT WILL MAKE MINES.

In the Trail Creek camp, from their present appearances, there are fully twenty prospects that will make mines. Below is a short notice of each.

First and foremost of these prospects is the Great Western, which almost lies at the back door of the town of Rossland. On this property there is a vein 40 ft. wide from which solid ore can be broken at any place. The property is situated on a flat and it will be a difficult one to mine on account of water. However, a recent strike of chalcopyrite ore in a shaft at a depth of 40 ft. leaves no doubt but this property will soon come to the front rank.

#### IRON HORSE.

This mine, situated on the south slope of Monte Cristo mountain, has a wonderful showing. The War Eagle vein, it is presumed, traverses this property for its entire length. Six thousand dollars in development work has proved the existence of a colossal body of low-grade ore. A trial shipment of 40 tons was made last fall to the smelter, which yielded \$19.98 per ton. A contract for a three compartment vertical shaft, 300 ft. deep, from which both the Virginia and the Iron Horse will be worked, has been let. The property will also be fully exploited by a diamond drill.

#### C. & C. AND EVENING STAR.

Adjoining the Iron Horse on the north are the C. & C. and the Evening Star, two properties that from the grade and extent of their ore body will certainly make mines. A 20 ft. shaft on the C. & C. has disclosed a body of arsenical iron ore of an \$80 grade. The same lead has been stripped for a distance of 200 ft. on the Evening Star, and assays ranging from \$20 to \$52 in gold have been found the entire distance. The owners of the latter property are driving a crosscut tunnel to tap this vein. Two carloads of ore shipped from the Evening Star gave returns of \$33.00 in gold per ton.

#### GEORGIA.

The Georgia, the property of a Victoria syndicate, is fast making a mine. It has an east and west vein, presumably the same as found on the Evening Star, that is developing nicely. The ore on this claim averages about \$20 in gold per ton.

#### NORTH STAR.

The North Star, which adjoins the Columbia on the north, has a splendid showing in a 55 ft. shaft of ore with the same arsenical attributes

that characterize the ore of the Columbia and Kootenay. This property was recently sold to the Lillooet, Cariboo and Fraser River Gold Fields Co., of London, England, for \$18,000 cash. It is the intention of this company to thoroughly prospect their ground with a diamond drill. About one hundred tons of high-grade ore are on the dump.

#### MONTE CRISTO.

The Monte Cristo, lying on the hill of the same name about one-half mile distant from the town of Rossland, has, without a doubt, the strongest and best defined lead yet uncovered in the Trail Creek camp. It is not a question of body of ore with the Monte Cristo, but a question of depth. Three tunnels have opened up a body of sulphide ore the peer of which would be hard to find on the North American continent. A company composed of mining men of reputation and practical experience has just been formed to work this property. Since taking hold they have sunk a shaft, the full width of which is in solid ore.

One tunnel has been driven on the vein for some distance, and wherever depth has been obtained, the ore shows an improved value. Tunnel No. 2 has just been started and will tap the vein at a depth of about 600 ft. from its apex. A contract for a 50 ft. shaft had also been let. Financially speaking the company is a strong one, and the reputation and experience of the men who control its capital stock are a guarantee to investors that if there is a mine in the Monte Cristo ground it will be found. Just as this article is being written it has been ascertained that the vein of high-grade ore recently found on the C. & C. cuts through a large portion of the Monte Cristo. A contract has been placed with the Ingersoll Rock Drill Co. for a 7-drill compressor and a full complement of Ingersoll Sergeant drills. This plant will be in operation by the 15th day of August.

#### ERIC.

This is a property that a month ago was unknown; today it has one of the most enviable showings in the camp. At a depth of 4 ft. a solid body of ore, 3 ft. in width, that averages 18 per cent. copper, \$12 in silver and \$18 in gold, has been uncovered. The shaft is now down 20 ft., and the ore body is widening and grade is more than holding its own.

#### COMMANDER.

The Commander is situated two miles east of Rossland, and is the property of Rossland mining men. Development work has been going on in a desultory manner for the past year, and now at a depth of 75 ft. an ore body 8 ft. wide has been uncovered that will average nearly \$50 per ton in gold and copper. A first-class hoist and sinking-pump have just been installed. At a depth of 100 ft. it is the intention of the owners to run drifts both ways on the vein. There are 100 tons of ore on the dump which will be shipped during the month of July.

#### CITY OF SPOKANE.

The City of Spokane, which adjoins such well-known properties as the Cliff and Iron Mask, has just been bonded by the locator to the Lillooet, Fraser River and Cariboo Gold Fields Syndicate, of London, England, for \$65,000.00. This company has already started in on active development work. A crosscut tunnel, driven for a mammoth surface outcrop, has just struck the vein, and already 5 ft. of ore has been uncovered. This company is close and conservative, consequently assay values of this ore are unobtainable, but it is known to be low-grade. An order has been placed with machinery men for a small prospecting air-compressor outfit.

#### GERTRUDE.

This is a property, probably the best partially developed prospect in the camp, lying only 1,100 ft. west of the great War Eagle. It catches the War Eagle lead the entire length of the ground. It is the opinion of mining men that up to date the property has been mismanaged, and \$6,000, spent last summer in development work, was thrown away. However, reorganization of the company has taken place, and a contract for a tunnel 200 ft. in length, to tap this vein, has been let. Already ore



of shipping grade has been struck. It is the intention of the company to put in a first-class power plant.

#### WEST LE ROI AND JOSIE CONSOLIDATED.

In the Annie, Sarah and Rockingham fraction, the West Le Roi and Josie Consolidated Mining Company have a property of considerable promise. Joiningsuch claims as the Le Roi and Josie on the west, and of a surety catching both veins, it is almost a miracle if this property does not make a mine. A crosscut tunnel was started last summer, but never completed. A shaft has been sunk in solid ore for a depth of 50 ft.

#### MORNING STAR.

It was not until late in the winter that development work on this property was started. However, a 66 ft. shaft, sunk on the footwall side of the vein, shows a body of ore that will average \$29 a ton in gold and copper. The ore is a chalcopryite in a quartz and calspar gangue, and very much resembles the high-grade ore taken from the Le Roi between the 250 and 350 ft. levels. A contract has just been let to sink this shaft to a depth of 300 ft. Development drifts, to thoroughly exploit the mine, will be run every 100 ft. A first-class hoisting-engine and sinking-pump, have been ordered, and will be in operation almost immediately.

#### HIGHLAND

This is a most peculiar property, and deserves special notice. It is the property of Mason S. Thomson, of San Francisco, who has been steadily developing it for the past nine months. The vein is large and shows, where crosscut, to be fully 200 ft. in width. It has every appearance of the ribbon structure, and with development should turn out a valuable property. It has been developed more fully than any other prospect in the extreme north belt. Associated with Mr. Thomson are some of the millionaires of California, and they will test the property to the fullest. Should development work prove satisfactory, the gentlemen controlling this property are prepared to mine and treat the ore from the claim at a minimum of expense.

#### LILY MAY.

The Lily May, the earliest location in the Trail Creek camp, is fast making a mine. Like other claims in Trail Creek, the Lily May has a history. It was bonded by a man, said to be a mining operator, without looking at it, and in twenty days he had dug it out and condemned it. Nevertheless, it was re-bonded this spring by one of the owners of the Le Roi and his partners, and now, at a depth of 90 ft., the Lily May has the prettiest showing in the camp. Two hundred and fifty feet of development work show up an almost continuous chute of ore. It is a fact worthy of mention that the galena characteristics of the south belt are "playing out" as depth is obtained, and the ore is showing the same copper and iron sulphide attributes as that of the Red Mountain mines. The owners have nearly 150 tons of good ore on the dump, which will be shipped to the Trail smelter in the near future. It is the intention of the company to instal a first-class compressor and hoist.

#### DEER PARK.

The Deer Park, situated on Deer Park mountain and the property of a local syndicate, is to the south belt what the Monte Cristo is to the north. A shaft has been sunk for a depth of 65 ft. on the ore body, which proved, upon cross-cutting, to be 41 ft. wide, all solid metal. The grade is extremely low, though recently, in surface prospecting, a 6 ft. chute of \$13 ore was discovered. The company is regularly developing this property.

#### NEST EGG.

The Nest Egg, which almost adjoins the town of Rossland on the south, has a very meritorious showing. It has three veins. Nearly all of the work which has been done so far is upon what is known as the south vein. The shaft is down nearly 40 ft., and at the bottom shows some high-grade copper ore. This ledge, farther to the east, has been

stripped for a distance of about 50 ft., and shows about 28 in. of solid ore the whole distance. This ore will average \$23 in gold. There has been some dispute about the title of this ground, which the company have just succeeded in perfecting. With development work the Nest Egg ought to make a mine. It has ore, grade and every necessary adjunct for the making of a valuable property.

#### HOME STAKE.

The Home Stake adjoins the Nest Egg on the south. It has been badly mismined and mismanaged. Four shafts, which will aggregate 200 ft. of work, within a few feet of one another, have proved nothing beyond what surface development showed. It is the concensus of opinion among mining men that this property, if properly handled, would be one of the wonders of the camp. Its location, immense body of ore, strong vein and everything else, places it in a position to rapidly become a shipper. About 50 tons of ore left this mine for the smelter last fall, but the returns are unobtainable.

#### ROBERT E. LEE.

The Robert E. Lee, lying 1,500 ft. to the east of the Home Stake and on the same vein, shows up well. A shaft 65 ft. in depth has a full body of \$30 ore. Surface work has proved that this orechute extends for a considerable distance to the east of the shaft. The property has lain idle for some time, but will be started up again within a few weeks.

#### SOUTHERN CROSS AND WOLVERINE CONSOLIDATED.

This property consists of the Wolverine, Southern Cross and Iron Hill locations, and adjoins the Crown Point. It has recently been incorporated by the original owners, who are proceeding to expend \$5,000 in development work. About 200 ft. of work in the shape of shafts and tunnels has disclosed a large body of ore, which will average about \$16 in gold per ton. There are four distinct veins on this property, upon one of which, recently found, there is a good body of fine-grained chalcopryite ore in a quartz gangue. Work will be started on this vein.

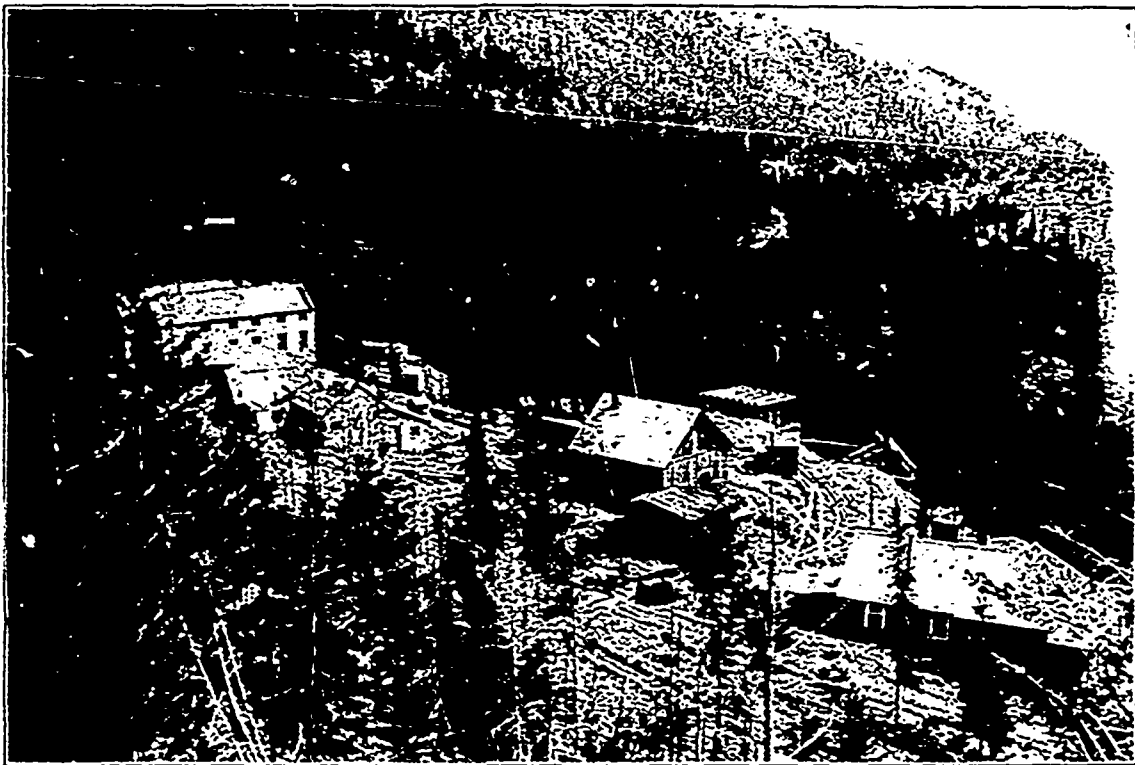
As there are about 3,000 locations in the Trail creek camp, of course every claim with a showing cannot be mentioned, but those of which mention has been made are among the most likely ones to make mines, judging from their present state of development.

#### TRAIL AND ITS SMELTER

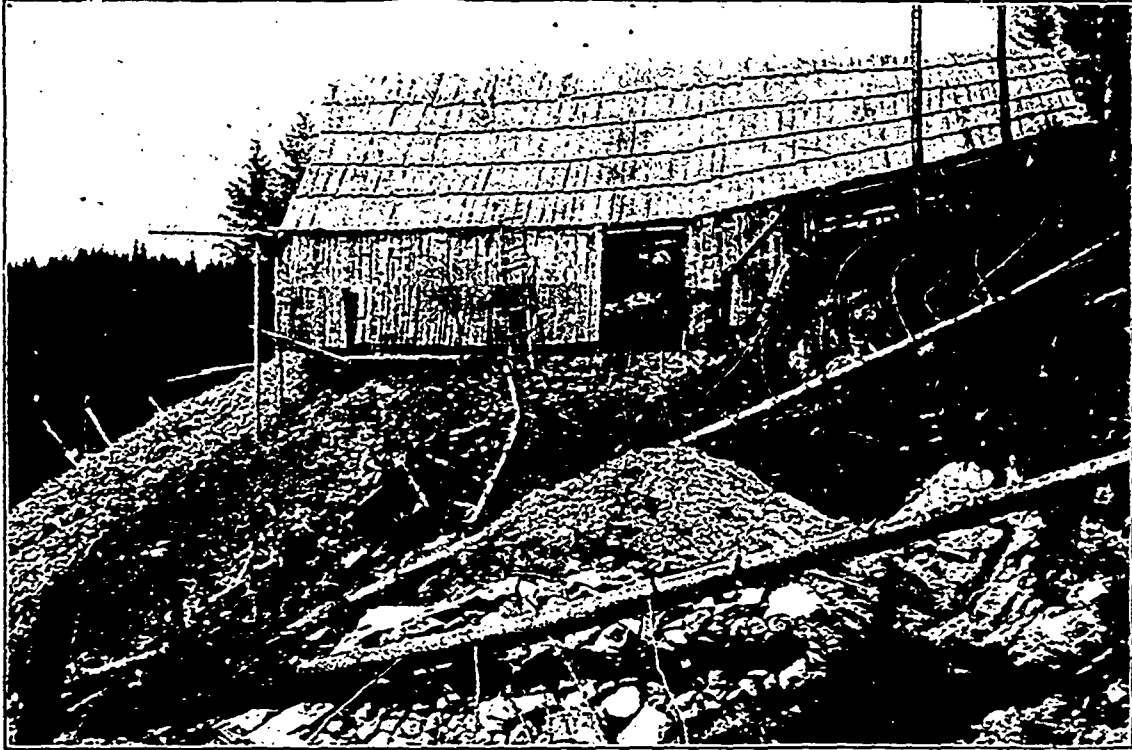
The progress of the Trail Creek mining camp during the past two years has been largely the result of individual effort, and a larger share of honor for the magnificent showing made by the camp is probably due to Mr. F. A. Heinze than to any other man. Mr. Heinze, a man of means, and a mining engineer and smelting man of large experience, came into the camp at a period when its mines had not the extent they have today, and, recognizing the need of a local smelter, he proceeded to build one. He closed a contract for 75,000 tons of Le Roi ore to be delivered within two years, and then chose Trail, on the Columbia river, as the most suitable point for a smelter. He has practically turned the town of Trail from a sand-heap, where the Columbia river boats landed passengers from Rossland, into a town of 1,500 inhabitants, whose energy is at all times noticeable in their loyalty to the smelter town. Mr. Heinze knocked about \$6.00 per ton off the previous freight and smelter charges for the treatment of Trail Creek ore; and the excessive transportation charges by waggon-hauling between the mines and the smelter soon convinced him that he needed a railroad in his business. This railroad is now a fact, and besides doing a lucrative passenger and freight business between the mines and the Columbia river, is hauling 150 tons of ore from the Le Roi to the smelter daily.



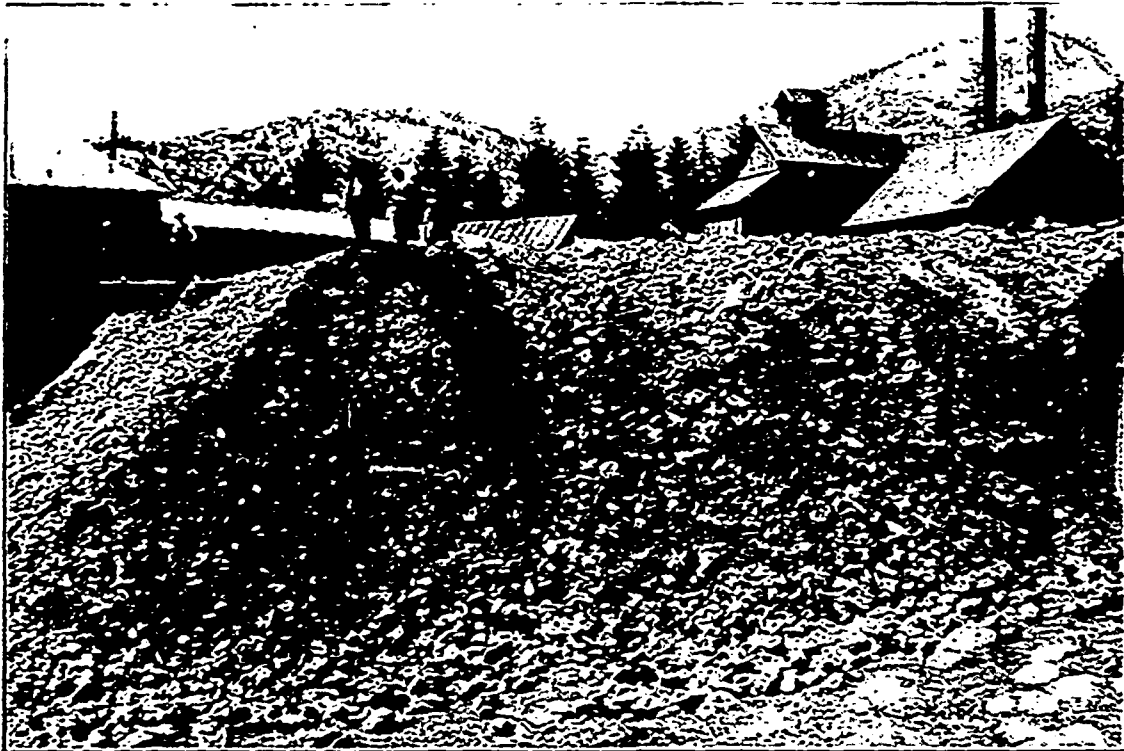
Group taken at Cliff Mine.



Surface Works at War Eagle Mine, Trail, B. C.



Crown Point Mine, Trail Division, B. C.



LeRoi Mine—Pile of 5,000 tons Ore awaiting completion of the railroad for transportation to Trail Smelter.

Mr. Heinze has secured a charter for the extension of this road into the Boundary Creek camp, 100 miles to the west.

The smelter is a model plant in every respect and consists of three buildings, namely: The sampling works, of 250 tons daily capacity; a furnace building, in which a blast furnace and four reverberatories are running night and day; the third building is occupied by a double-deck automatic set of O'Hara roasters. The ore-bins already up in the yard are capable of holding about 3,000 tons. An ore platform for a like capacity is being built. The ore when it reaches the smelter is first run through the sampling works, then assayed, and from this sampling paid for. From there it goes to the roaster before going into the furnace.

A word about the calcining of the ore that goes into the reverberatories. Mr. Heinze has innovated a very simple device for cheap roasting. Above each reverberatory there are four large circular calciners, revolving round a vertical shaft, into which ore is dumped, and the heat from the reverberatories is communicated to these calciners and the ore calcines itself, and by the means of a double set of hoppers discharges itself directly into the furnace, thereby affecting a saving in the cost of fuel and handling. The cupola is operated by a Root centrifical fan; a Mansfield automatic cut-off engine furnishes the power. The capacity of the smelter is 200 tons, and three carloads of matte are being turned out daily and shipped to Butte to be refined. Mr. Heinze has given out that this smelter will be kept up to its present state of efficiency, and its capacity will be increased as rapidly as the requirements of the camp demand it. He is in the field to buy all the gold, silver and copper ore in the market. All ore is paid for on assay at the smelter. He is willing to receive ore from one-ton lots up, and his treatment charges are a third less than have heretofore been known.

#### SURROUNDING DISTRICTS.

Not less remarkable than the development of the producing mines in the immediate vicinity of Rosslund have been the rapidity with which prospecting has been pushed afield and the discoveries which have been made in other sections of the Trail Creek mining division. Wherever the formation in which the Rosslund mines were discovered has been found, claims have been located and surface development work done. And already out of a chaos of locations, mineral zones have been defined which bid fair to equal, if not rival, the basin of Trail Creek.

The most remarkable of these, as it is certainly the most extensive, is known as Murphy Creek. It begins, roughly speaking, about six miles due north of Red Mountain, and extends some eight miles farther in a northerly direction. There are as yet no roads, and only the roughest of trails into this country, but in spite of this the most promising looking showings are being rapidly taken hold of by stock companies or under bonds. Two of the biggest propositions in this section are the "Paymaster" group, which has been acquired by an English company, and the "Empire" group. On the latter the highest grade ore yet found in the Murphy Creek zone has been discovered. The ore is similar to that of Red Mountain, but rather more silicious.

On the east bank of the Columbia river a zone of undoubted richness has been found, and the excitement over it at the present moment is intense. What it will finally be named it is hard to say. It can be approached by three routes—Bear Creek, which falls into the Columbia river two miles below Trail; Champion Creek, some eight miles above Trail, and from Waterloo landing, still farther up. And accordingly it is known by some as the Bear Creek camp, by others as the Champion Creek camp, and by still others as the Waterloo camp. The commencement of this belt is well defined by an enormous dyke of eruptive rock, running in a northerly and southerly direction, and in an air line some three miles east of the Columbia river. It has been traced and located from the headwaters of Bear creek, through the headwaters of Champion creek, where it is traversed by a belt of granite, or bull quartz, about two miles wide and on to the Waterloo camp proper. Mineral was first discovered in this district in 1891, and some ground located on a very

large cropping on the head of the south fork of Champion creek. Some high-grade float was found, but the prospectors confined their attention to a barren dyke of porphyry mixed with some white quartz, apparently in the hope of finding free-milling gold ore. Failing in this they abandoned the ground. It was re-located last summer as the "Jeff Davis" and "Free Coinage", and the locators, wiser for the experience of Red Mountain, worked on the iron-stained cap-rock. This they have broken through in several places and have disclosed a large showing of ore. The ore is a fine-grained arseno pyrite mixed with chalcopyrite in a gangue of hard blue quartz. It runs high in gold. These claims are now in the hands of a powerful English syndicate. Several claims along this lode are being worked by joint stock companies, of which the Black Hawk is the furthest developed. In the Waterloo camp the "Apache" group has been bonded by the Lillooet, Cariboo and Fraser River Gold Mining Co. This group shows an immense surface outcrop.

From present indications, it would seem as though the Columbia river between the 49th parallel and the main line of the Canadian Pacific Railroad, was about to become the outlet of a gold producing country, which will pale the lustre of California, Australia or the Rand.

#### Warning to Investors.

The remarkable activity in the development of our mining enterprises has unfortunately brought with it a craze for company promotion and stock jobbing speculation. Mr. J. J. Kingsmill, Q.C., President of the Ontario Mining Institute, is to be commended for promptly sounding a note of warning to our Canadian investors in the following letter to the President of the Toronto Board of Trade:—

"The object of the Ontario Mining Institute being to mutually benefit and protect its members, I, with the approbation of some members of the Council, deem it advisable at the present time, when there is likely to be a very large amount of stock of British Columbia and Ontario mining companies put upon the Toronto market, to sound a note of warning to our associates and others about to invest, and to ask the co-operation of the Toronto Stock Exchange and the brokers generally to assist in keeping the dealing with mining stocks within what is strictly legitimate and fair business, and thus protect the unwary.

As has been the case in all mining booms, not only in the United States, but elsewhere, many companies will doubtless be formed, with really very little to justify their incorporation. In many cases this has been done when the promoters had nothing beyond a mere option to purchase, and then, with an irresponsible Board of Directors, placed their stock upon the market at an enormous discount, and, quietly pocketing the cash, left the unfortunate purchasers of the shares with a property subject to heavy payments, absolutely worthless in itself, or absolutely valueless by reason of their being unable from lack of time, experience or capital to handle it.

People about to invest should be cautious before parting with their money, and should satisfy themselves, among other things, upon the following points:—

- (1) Whether the so-called company has been incorporated, and where?
- (2) Whether the stock is paid up and unassessable; if not, what is the extent of the liability of the holders of it? (This depends on the legislation at the place of incorporation.)
- (3) Whether the company (if incorporated) has procured a Crown grant for the mining locations which they are supposed to control.
- (4) Whether any development work has been done; and if so, whether it is established that the location justifies further expenditure.
- (5) Whether the incorporators are men worthy of the trust reposed in them, and such men as the investors would trust with the management of their affairs and the investment of their money.
- (6) Whether money raised on the first sale of stock is to be devoted to development purposes or not; if not, a good reason for declining to accept shares would thereby be afforded.

In my opinion no portion of promoters' stock should be placed upon the market until sufficient treasury stock has been disposed of, and expended to demonstrate the value of the property.

The Stock Exchange and brokers can keep up the reputation of our city, protect their clients and the public, and ultimately secure a more lucrative business by declining to list or deal in any shares issued by any company which cannot satisfactorily answer all of the above inquiries.

There will in the next few months, and I hope years, be ample scope for making money in mines and mining stock in a fair and legitimate manner, and we should be careful not to jeopardize that prospect and the good name of our city by countenancing even in the slightest degree anything that might, in mining parlance, be termed "wild-cat propositions."

## NOVA SCOTIA GOLD RETURNS.

The following mill returns have been reported to the Mines Office since our last statement:—

	Tons Crushed.	Yielding Oz. Dwt. Grs.			Totals Oz. Dwt. Grs.		
<b>Sherbrooke District—</b>							
Crow's Nest mill for month of June .....	45	19	..	..			
New Glasgow Co., for month of June .....	310	137	..	..			
McNaughton mill for month of June .....	100	57	..	..			
Total tons.....	455	213	..	..	213	..	..
<b>Stormont District—</b>							
J. A. Fraser, in April and May .....	330	79	10				
Griffin Gold Mining Co., in May.....	158	82	8				
J. C. McDonald, in April, May and June .....	251	261	15				
Richardson Gold M. Co.....	3610	493	..				
Total tons.....	4349	916	13		916	13	..
<b>Caribou District—</b>							
Moose River G. M. Co., in June .....	157	73	8	..			
Damas Tuquoy, in May and June (slate).....	1295	108	19	12			
Caribou G. M. Co., Jan., Feb. and March.....	231	250	1				
Total tons.....	1685	432	8	12	432	8	12
<b>Wine Harbour—</b>							
W. A. Adams, in May.....	155	59	1	..	59	1	..
<b>Uniacke District—</b>							
Jas. Thompson, in Feb., Mar., April and May .....	118	143	2	3	143	2	3
<b>Waverley District—</b>							
Tudor Gold Mining Co., in April, May and June.....	877	246	15	..	246	15	..
<b>Lake Catcha District—</b>							
John Anderson, in May and June.....	82	81	10	..	81	10	..
<b>Cow Bay District—</b>							
Thompson & Hill, on 30th June.....	40	57	6	..	57	6	..
<b>Renfrew District—</b>							
Pictou Development and M. Co., Oct., Nov. and Dec., '95, and Jan., Feb. and March, '96 .....	457	309	8	..	309	8	..
<b>Fifteen Mile Stream—</b>							
New Egerton, April and May.....	1079	629	5	..	629	5	..
<b>Brookfield District—</b>							
Brookfield M. Association, June.....	452	385	..	..	385	..	..
<b>Oldham District—</b>							
Foster's Mill, Feb., March, April, May and June.....	32½	35	9	5	35	9	5
Total yield since our last returns .....		3508	17	20			

## EN PASSANT.

Within a few miles of Woking, Surrey, lives a man who fought in the Crimea, being wounded at Sebastopol; he went through the Indian Mutiny; he proceeded to South Africa, fought the Zulus, and had some bouts with the Boers. For £350 he purchased tracts of land (715,000 acres), including the site of the Johannesburg, the Crocodile region, known as the Limpopo district. Then came the Transvaal annexation in 1880. He was called upon to serve under President Kruger. He objected, and eventually his property was confiscated. But for this he would have been worth millions, instead of being an invalid in a work-house infirmary.

At the last meeting of the Leeds Association of Engineers, Mr. Wilson Hartnell, M.I. Mech. E., read a paper on "Flywheels and the Governing of Engines." Perfectly steady governing, he said, was impossible, because a governor could not act till the speed was varied, and even a nearly uniform speed could not be attained without the aid of a flywheel. As the usefulness of a flywheel depended upon its stored-up energy, and its cost chiefly on its weight, it was desirable to run its rim at the highest practicable speed, say never less than 3,000 ft. per minute. The most accurate governing had been obtained by flywheel power of twenty-five to thirty-five strokes or semi-revolutions, by correctly designing, fitting and setting the valve-gear; by the greatest care in designing and fitting the governor and its connections to the valve-gear, by ball-bearings; by auxiliary power to aid the governor, and in the compound engine by special setting of the valve-gear. Gas engines could be made to run quite as steadily as steam engines. With a flywheel power of thirty-five impulses, no flywheel power on the dynamo was necessary. Some of the best examples of gas engines for driving dynamos had over forty impulses of flywheel power. By the aid of powerful flywheels, special designing and great attention to details, the best steam engines

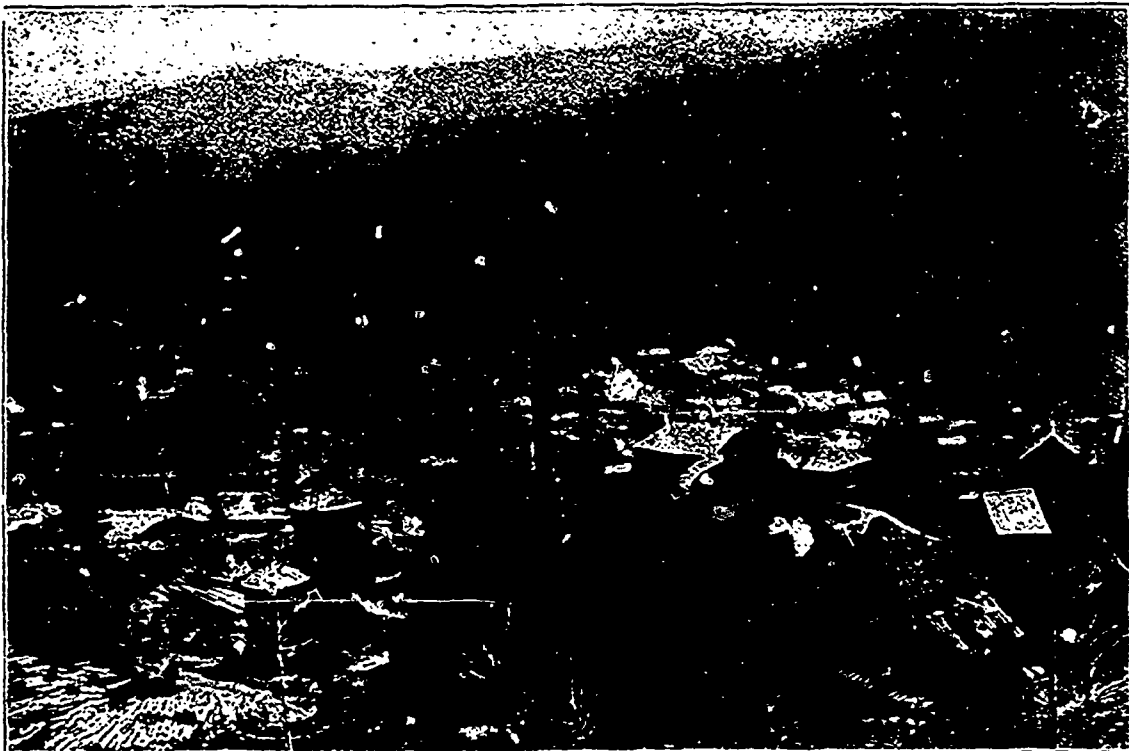
were now governed by a precision which some years ago would have been deemed impossible.

For some time interesting experiments in the use of peat in the manufacture of iron have been proceeding in Glasgow. The Peat Carbon Syndicate, Limited, whose chiefs have for a long time been experimenting with peat, have come to the conclusion that it can be turned to profitable account, and the result of their very thorough investigations points to the conclusion that it can be converted into charcoal at least equal in quality to that obtained from coke, and at a price that will enable it to compete with coal and coke. The charcoal is peculiarly adapted for smelting iron and making steel, and in that direction, the proprietors believe, its greatest commercial success will be achieved. It is a pure fuel, free from phosphorus and sulphur, and it contains considerably over 90 per cent. of carbon. In the blast furnace it bears a greater ore than charcoal from wood, and the syndicate claim that it will enable users to produce from Scotch or English ores iron or steel equal to the best Swedish at a price in addition very much lower. In converting one ton of dried peat into charcoal some 13,000 cubic feet of gas of sixteen and a-half sperm candles, and perfectly free from sulphur, is produced.

At a meeting of the Prussian Union of Boiler Inspectors a paper was read by Mr. G. Schneider which is abstracted by *The Colliery Guardian* (Dec 20) as follows: "In June, 1894, three trials were made of the Schwartzkopf system of utilizing powdered coal as a boiler fuel. The boiler used was two-flued, the coaldust apparatus being fixed in front of one flue, the other being divided longitudinally by a partition, so that the hot gases traversed the length of the boiler three times before passing into the chimney. It rested on three cast-iron stools, had no special setting, and therefore the loss of heat by conduction and radiation was unusually high. The results of the experiment did not, therefore, give a sufficiently clear measure of the effectiveness of the fuel-supply apparatus. Three kinds of coaldust were used, of calorific values 7.3-5,



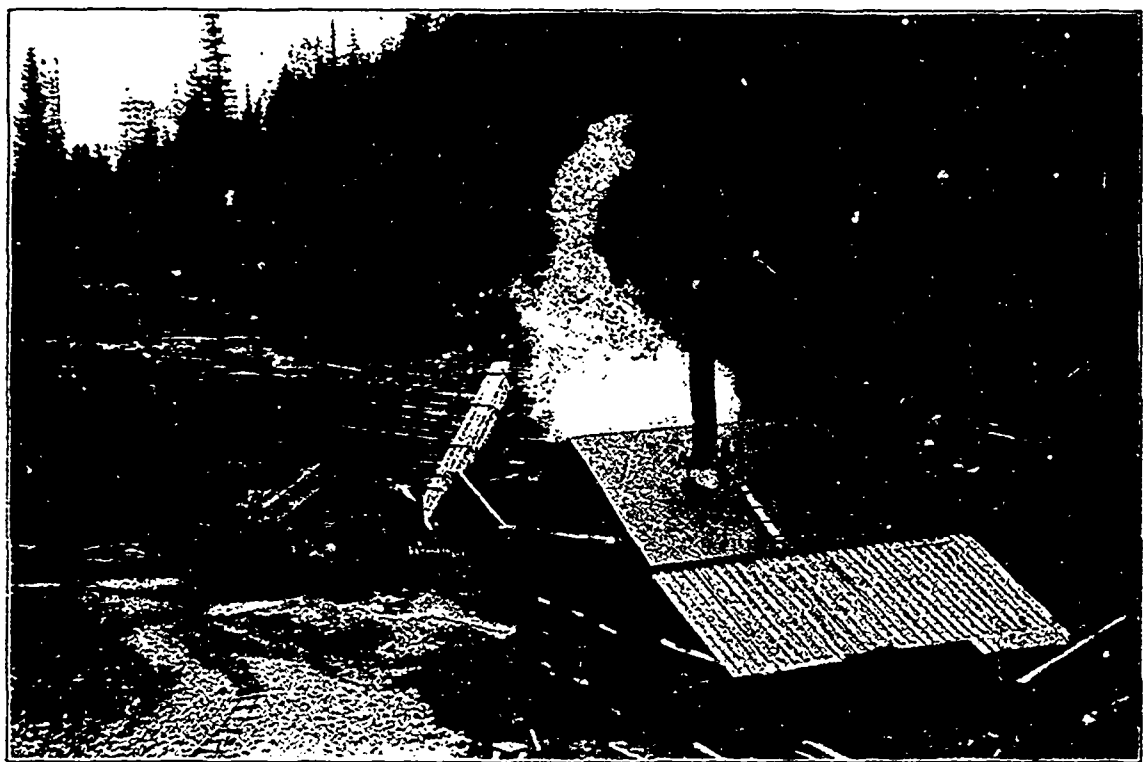
Columbia Avenue, Rossland, B. C.



Surface Works at Le Roi Mine, Trail, B. C.



Installing Machinery at the Comander.



The Centre Star Mine.





horses, and a large quantity of valuable mullock of the first water. I recommend you to sink a spiral trial shaft beneath the south-east and by north angle of the vertical slide where the fudgite cross-cuts the rubbishite and intersects the blue road metal. A judicious expenditure of other people's capital should render the property payable. There is an abundance of mental and physical exercise to be got out of this mine for a mere trifle, comparatively speaking. Sweat and capital will produce wonders.' I now offer this promising property for sale on easy or uneasy terms. Besides the above shaft, I have sunk all my relatives' capital on the show. If the purchasers take out only what I have put into it, great will be their dividends.

### Asbestos and its Uses.

There is probably no production of inorganic nature about which there is so much popular mystery and misconception as asbestos. It is vaguely understood that the principal claim of this remarkable product to attention is that it cannot be consumed by fire, and not infrequently the effect of the mention of asbestos is to carry the hearer back to the days when the people of the Pharaohs wrapped their dead in cere-cloths woven from the fibre, in order to preserve them, the body having been first embalmed. Romantic stories have also come down to us of ancient demonstration of magic in which asbestos has played the leading part; but the real interest in asbestos centres in the present. It is of more importance to the human race to-day than it has been in the whole range of history. Asbestos twenty-five years ago was practically not



known in the laboratory of the chemist or mineralogist. It now finds its way in one form or another into every workshop where steam is employed.

To the question, "What is asbestos?" it is not altogether easy to find an answer. Geologists classify it among the hornblendes. In itself, asbestos is a physical paradox, a mineralogical vegetable, both fibrous and crystalline, elastic yet brittle, a floating stone, but as capable of being carded, spun, and woven as flax, cotton or silk. It is apparently a connecting link between the vegetable and the mineral kingdom, possessing some of the characteristics of both. In appearance it is light, buoyant and feathery as thistledown; yet, in its crude state, it is dense and heavy as the solid rock in which it is found. Apparently as perishable as grass it is yet older than any order of animal or vegetable life on earth. The dissolving influences of time seem to have no effect upon it. The action of unnumbered centuries, by which the hardest rocks known to geologists are worn away, has left no perceptible imprint on the asbestos found embedded in them. While much of its bulk is of the roughest and most gritty materials known, it is really as smooth to the touch as soap or oil. Seemingly as combustible as tow, the fiercest heat cannot consume it, and no known combination of acids will destructively affect the appearance and strength of its fibre, even after days of exposure to its action. It is, in fact, practically indestructible. Its incombustible nature renders it a complete protection from flames, but beyond this most valuable quality, its industrial value is greatly augmented by its non-conduction of heat and electricity, as well as by its important property of practical insolubility in acids.

Asbestos has been found in all quarters of the globe. It comes from Italy, China, Japan, Australia, Spain, Portugal, Hungary, Germany, Russia, The Cape, Central Africa, Canada, Newfoundland, United States, and from Southern and Central America. The asbestos generally found in the United States, especially in Virginia, the Carolinas, and Texas, also in Staten Island, New Jersey and Pennsylvania, is in appearance

like fossilized wood. The veins range in length from a few inches to several feet. The fibre can be split off like soft wood, the appearance being woolly, and when separated it has no strength or cohesion. It cannot be spun nor even pulped. At one time it was thought it might be profitably used as a filler in paper making, but virtually it is of no commercial value.

Notwithstanding this wide distribution of asbestos, the only varieties which at present appear to demand serious consideration, from a commercial point of view, are the Russian, the South African, the Italian, and the Canadian. The principal claim possessed by the Russian fibre to a place in this quartet is based on the enormous extent of the deposits which have been discovered in East Russia, beyond the Ural Mountains, and Russian Siberia. So far, their specimens have been of comparatively poor quality. The yield is used almost entirely in Europe, where it is mixed with the Canadian for spinning, making paper, and other purposes where an inferior grade can be utilized.

Before the development of the Canadian fields, the Italian asbestos was supreme in the market. For nearly twenty years Italy has been looked to for the best grades of the fibre. From a point on the northern mountain slope of the Susa valley is taken the floss asbestos fibre, the appearance of which in gas stoves is so familiar. In the same locality is found a fine white powder of asbestos, which serves for paint and other purposes. The mining is carried on at a height of from 6,000 to 10,000 feet above sea level.

But the Italian asbestos industry, once so important, is already on the down grade. The difficulties of mining are very great, and unduly increase the cost of production. The asbestos itself, judged by the latest standards, is of inferior quality, it is not easy to spin, and it does not pulp well in the making of paper. The best grade is extremely rare, and its cost of mining and transportation is prohibitive. The supply from the Italian mines is rapidly falling off. As a matter of fact, Canada contains the great asbestos region of the world, in the sense that while its mines are practically unlimited in productive capacity, the product is of a quality which fully meets the requirements of the newest and most exacting of the innumerable uses that are daily being found for it.

The process of manufacture is intensely interesting, more especially from the fact that as the industry is constantly entering upon novel phases, new methods of treatment and special machinery have to be devised. One of its special uses is for wall-plaster. This is a new application which will have a distinct effect in modifying the practice of indoor plastering. Instead of the ordinary tedious and elaborate preparation of studs and strips, and the use of inferior and dust-creating mortar, with its after-scoring, which is necessary to give cohesion to the final coat of plaster of Paris, a single coating of the asbestos is laid on. It has a glossy surface that will not crack, as, while firm, it is perfectly flexible. It can be put on the raw brick; and a room of which the walls have been built in the morning can, before night, have a smoothly finished interior surface, shining like glass and hard as a rock. A kindred application of asbestos is now coming into vogue in the shape of unflammable decorations for walls and ceilings. These are used a great deal for the saloons of steamships. They are embossed in very beautiful designs, and can be treated with gold, varnish, lacquers, or any other substance, for the enhancement of their ornamental effect.

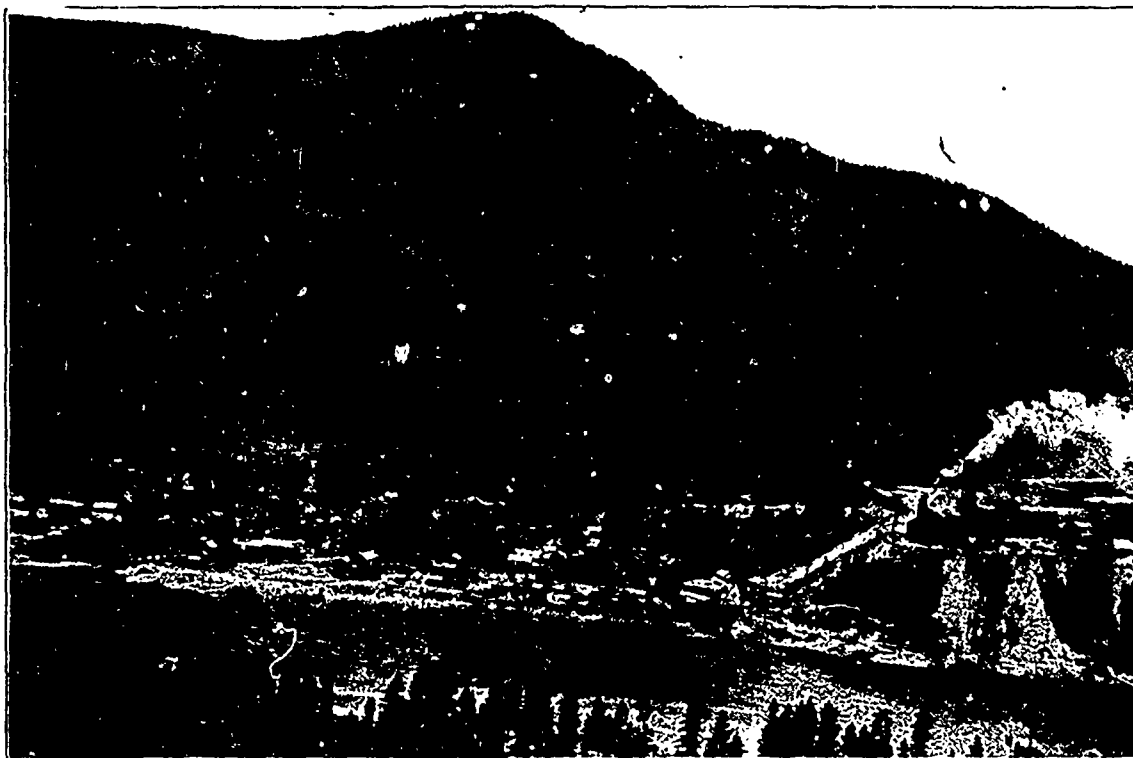
Firemen clad in asbestos clothing and masks, as are those of London and Paris, can walk through the hottest flame with comparative impunity. Asbestos fire-proof curtains have reduced the mortality of theatre fires in a very appreciable degree. In torpedoes, the difficulty of dealing with the charges of wet gun-cotton is overcome by enclosing them in asbestos, the employment of which has also, in a great measure, brought the dynamite shell to its present efficiency. Asbestos is made into a cloth available for aeronautical purposes. A balloon made of this unflammable material escapes one of the most terrible dangers to which an ordinarily constructed balloon is liable. Probably one of the first applications of asbestos in this country was to roofing. To build-



Twenty-drill Compressor, at War Eagle Mine, B. C.



Iron Mask Tunnel, Trail, B. C.

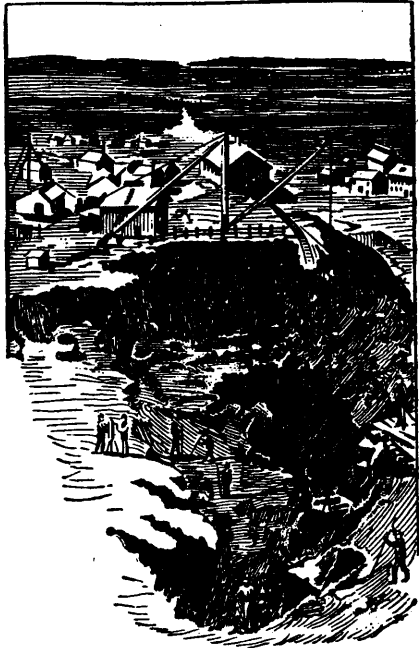


Town of Trail, and Smelting Works.



Engine and Shaft House, Josie Mine, B. C.

ings covered with this material, the shower of sparks from a neighboring conflagration involves no danger. The fact that woodwork can, by its use, be made unflammable has come to be an important factor in the insurance of buildings. One of the largest branches of asbestos manufacture is that of sectional cylinders for pipe-coverings, for retaining the heat of steam and other pipes, felt protective coverings for boilers, frost-proof protections for gas or water pipes, and cement felting, which can be laid on with a trowel, for the covering of steam pipes boilers or stills. In some of these cases, where it is only necessary to retain the heat, the asbestos is mixed with other substances; but where the protection must be fire-



proof as well, only asbestos is used. The utility of such a covering is well illustrated in the heating system of railway cars. The main pipe from which the individual cars draw their respective heat supplies by side mains, if not covered with asbestos, would lose a large proportion of its caloric from the rapid motion of the car through the air. An interesting innovation in this class of manufacture is asbestos sponge. It is not generally known that sponge has great powers of fire resistance. The discovery was made accidentally not long ago, and the result was that a consignment of scraps of sponge picked up on the southern coasts was ordered for experimental purposes. The sponge was finely comminuted and mixed intimately with asbestos fibre. The combination was found so successful for any covering which had to be fire proof as well as heat proof, that the material has become standard. Being full of air cells, it necessarily makes an excellent non-conductor. Another very extensive department in asbestos manufacture is that of packings. Of these there are an infinite number of forms. In these days of high pressures and ocean records, it is of supreme importance to marine engineers that they should have jointing and packing materials on which absolute reliance can be placed. In order to meet modern exigencies every possible form of packing has been constructed, particularly with asbestos and metallic wire, and with asbestos and rubber cores for gland packing. The making of asbestos paper varies from the building up of the thickest millboard to the production of a writing-paper which, from its indestructibility, is invaluable in case of fire for preserving charters, policies, agreements, and other important documents.

To the electrical engineer asbestos is absolutely indispensable. Many parts of electrical devices and machinery and wires through which the electric current passes become heated, and were it not for the electrical insulation and heat-resisting qualities which asbestos possesses, the apparatus would be completely destroyed, particularly in the case known to electricians as "short circuiting". For such purposes it has been found advisable to combine asbestos with rubber and other gums, and this combination is now used universally for not only electrical, but also steam and mechanical purposes.

A considerable part of an asbestos factory is devoted to weaving, the asbestos being first drawn into thread for that purpose. Here again is an apparently endless diversity. There is the fire-place curtain-blower, which, with an automatic spring roller attachment, takes the place in the frame of the fireplace of the less sightly sheet-iron blower; and filtering cloths for many purposes, from straining molten metal to clarifying saccharine juices in beet root sugar refineries. A cloth is made for straining and filtering acids and alkalies in chemical laboratories. This is specially useful when the liquid to be treated is of a caustic or strongly acid nature. The filter can be thrown in the fire, and after the residual matter has been consumed, the web is as good as new. For filtering purposes generally, asbestos has a unique adaptability, and in tropical countries, it is held in grateful estimation as a cooler and purifier of water. The newest departure in the asbestos field is the construction of electrothermic apparatus. The heating effect of the electric current is utilized by embedding the wire in an asbestos sheet or pad. The pad is used by physicians and nurses for maintaining artificial heat in local applications, and is said to be already largely used in hospitals. Another application of the same principle is to car heaters. A sheet of asbestos with the embedded wires, is clamped between two thin steel plates, and the portable heater thus provided, or a series if need be, is connected to the car circuit quickly and easily. It gives an even and healthy heat and can be so regulated as not to overheat the car.

## GENERAL MINING NOTES.

### Nova Scotia.

The Golden Group Mining Co. are nearly ready with the plans for their new plant to be erected on the property lately owned by the Nova Scotia Gold Mines, Limited. During the month of May this group of properties produced 45 oz. of gold from 57 tons of quartz, the work being done by tribute.

The Modstock mine for the month of April produced 189 oz. 19 dwt. from 265 tons of ore.

Several properties in Goldenville, including the Springfield property, have been consolidated and a new 15-stamp mill is being erected, which, together with the 12-stamp mill on the Springfield property, will give a stamping capacity of 27 stamps. It is with pleasure that we hail increased development in this old-time district, which was the mainstay of early mining developments, and which even now has the best record in the country, although some of the best parts of it have been shut down for a considerable time.

Mr. Damas Touquoy has returned from France and will continue working his property in Caribou.

The Thompson Hill mine at Cow Bay yielded 91 oz. 8 dwt. from 50 tons of quartz during the month of May. Mr. Thompson intends crushing 50 tons of picked quartz this month, and expects a yield of about 200 oz. of gold. Considering this property was only discovered last August, it is showing up exceedingly well.

The Golden Group Mining Co. are getting their new plant in order rapidly. The old stamp mill will be used for the present. A new winding engine is being erected and also a new Rand air compressor. Things at Montague are looking better than they have for a long time and we expect before long regular bricks will be coming in from that district once more.

The Richardson Gold Mining Co. produced 493 oz. for May and June.

The North Brookfield mine produced 385 oz. from 452 tons of ore during the month of June.

The New Egerton mine produced 629 oz. from 1079 tons of quartz during April and May.

Miner T. Foster cleared up 35 oz. 9 dwt. of gold from 32½ tons of quartz. This property will probably be taken over by a strong American company who hold a bond of it.

Mr. J. E. Hardman has made a report on the Dunbrack property at North Brookfield, in the interest of Upper Canada capitalists, who have taken a two months working bond on the property.

The New Glasgow Co. produced a brick of gold weighing 137 oz. from 310 tons of quartz.

J. C. McDonald's property at Country Harbor yielded 261 oz. of gold from 215 tons of quartz.

Damas Touquoy soon got to work again after his trip to Europe; he was in the city with two bricks of gold weighing 109 oz., obtained from 1295 tons of quartz. The gold from this property is exceptionally fine even for Nova Scotia, and is worth on an average almost \$20 per oz.

It will be noticed that the returns sworn at the mines office during the month, which appear elsewhere, amount to 3509 oz. From present appearances there is every prospect of 1895-1896 being the best year on record, and for the benefit of the Province we would urge mine owners to keep their returns well up to date.

A petition has been sent to the Provincial Secretary asking for the removal of all royalty on gold obtained from tailings and concentrates recovered by the chlorination process. This petition has our fullest sympathy and we are sure the government of the Province would be making a wise step in granting the request.

Hugh Duffey *et al* are developing their property at Millipic and are just now getting some very handsome quartz.

A find of low grade plumbago has been made in Cape Breton, and mining operations will probably be started this summer.

A find of coal is reported from Bass river, Colchester Co., but no particulars are to hand.

### Ontario.

The Empress gold mine at Jackfish, Ontario, is being developed as rapidly as the force of men at work can do it. A drift has been run in from the hillside and when the vein was struck, a winze was sunk. The ore taken out shows equally as rich as does that on the surface. Free gold is encountered at almost every sink and the shareholders are quite satisfied with the outlook. The mine manager says that he never saw a better prospect in his life. A crosscut has been run on the vein and a large quantity of rock has been thrown up ready to run through the mill. A ten stamp mill is just about completed on the property, about 200 yards from the vein, at a point below a beautiful fall of water, which will develop all and more power than is necessary for the workings. It is expected that the mill will be completed by the 15th inst., and the first clean up will occur on the 25th.

The Canadian Copper Company is adding a third furnace to its plant. The three old mines of the company, namely, the Copper Cliff, the Stobie, and the Evans, are being worked to their fullest capacity now, with an output of 450 tons of ore a day. The company is also opening up two new mines this year, one a little west of the Copper Cliff, and the other in the township of Denison, and known as the Krane Hill, which is said to a valuable deposit high-grade nickel and copper ore.

*Ray-Wiegand Mine*—On the 1st inst., J. C. Foley paid over to Colonel Ray the balance due upon the above mine. The total price for this tract, viz: AL 74-5-6, was \$40,000. Mr. Foley has two shafts and several tunnels driven upon this claim, amounting to a total of 450 feet, their greatest depth being in the north shaft on AL 74, viz: 212 feet. At this depth the vein measures 3 ft. 6 in., and shows up rich in native and free milling gold ores. Only two drills are now in operation (Ingersolls). It is, however, anticipated that vigorous operations will be resumed there upon the arrival of Mr. Foley, now overdue.

At K198, adjoining Foley, Colonel Ray has a force of skilled miners stripping and sinking upon a series of phenomenally rich and strong lodes, three at least of which cut squarely across the formation with an average strike of N. 17 degs. west astronomical, and everywhere exposed, showing up rich in gold finely disseminated. As the mail closes, Colonel Ray arrived at La Seine river, where he will remain to complete his examination of the foregoing and other promising prospects upon Shoal, Bad Vermillion and Wild Potatoe lakes.

*The Turtle River and Lake*—Messieurs. John Rodi & Co. continue active development upon their estate of nearly 1,000 acres. This tract, unlike the Ray-Wiegand *et al* (in the protogene) is well within the area of Keewatin slates of Huronian age. Their ores are, for the most part, perfectly free milling, their lodes strongly defined and nearly parallel, with a very appreciable showing of native gold distinctly visible. Mr. Rodi hails from Drummond, near Christiansa, Norway. He is presently engaged in surveying and prospecting additional mineral lands north and west of his present camp.

*The Australian*—W. E. Stone adjoins the Rodi estate on the east. His claims, consisting of HP 140-1-2-3-4, and K 402, all of forty acres each, are traversed by the Rodi and another strongly defined quartz vein, showing and proving very nicely in most of the numerous pits and openings recently made thereon by Mr. Stone & Son, the sole owners.

*Camp Ferguson*—This property lately acquired by D. W. Ferguson, of London, England, consists of AL 110 and AL 111. A large and ever-increasing force of surface hands are busily engaged in preparing buildings, shafts and sites generally for the introduction of mining machinery; while three shifts of miners are sinking in the Finn and two other shafts driven upon parallel veins. Like the Ray claims on Shoal Lake (Foley), the Ferguson property is in the protogene (coarse crystalline granites), the veins cutting diagonally across the formation with a strike of N. 20 degs. W. astronomical. The Finn shaft is down 75 feet, the others averaging 30 feet each. Gold is perfectly visible to the naked eye in all their workings.

*The Upper LaSeine River*—Several rich finds have been made there lately and much interest is being taken by prospectors in the region adjacent to Harold Lake, where the Wileys of Port Arthur have been so successful with their mine and mill. Already several most promising locations were made in this immediate vicinity, and westward to Sawbill and eastward to Partridge lake. It was in this lake (Partridge) that gold was first discovered (over 24 years ago) by the MacKellar Bros. Rich lodes, assaying from 3 to 12 ounces of gold per ton have just been discovered there by an Indian from the lower reaches of La Seine.

*K 244*—This interesting property, situated on the north shore of Bad Vermillion,

like the Rodi and Stone lodes, immediately north, has lately produced some marvellously fine showings of native gold, with abundance of free milling ores. A small force of men under the direction of the brothers Bush and Fred Winning, are engaged in stripping and otherwise testing the claim with the most gratifying results. The K 244, with K 231, is owned by the Ottawa Syndicate. The former is in slate, while the latter is in the protogene granites, wherein almost all the auriferous lodes are true fissures. K 231 is also under partial development. This property is attracting considerable attention.

Mr. F. Cirkel, M.E., is rapidly pushing forward the construction of the new milling plant of the Ontario Graphite Co. at Ottawa. 370 tons of graphite from the company's mine have been shipped for treatment.

At the property of the Lake Harold Gold Mining Co., No. 2 drift is now in 140 ft., the vein in the breast showing a width of two feet. The last clean-up from the mill gave \$18 per ton. No. 1 shaft on the shore, now sinking, shows very rich ore and the manager claims it will mill about \$100 per ton. The vein here is, however, small.

Of the Saw Bill Lake mine, Mr. F. S. Wiley, the managing director, writes as follows: We started mining about the 25th April, and our shaft is down now to a depth of 35 feet. The vein had a width on the surface of three feet, and has since widened to 5 ft., showing free milling ore all the way, running from \$10 to \$30 per ton. This is certainly a good showing and if the present conditions continue, we have a very fine property. The quartz has a pinkish color, carrying besides free gold, a concentrate, composed of iron and copper pyrite and galena, which I should say or consider, would make about a 4 per cent. and average about \$150 to \$200. After I get down about fifty feet, it is the intention to start drifting, and by the time (say next January) when we can transport a mill, we will have sufficient ground opened up to keep 10 or 15 stamps humping (always provided that present conditions continue). This section at present is attracting the attention of any number of prospectors, and a few good veins have been discovered already this spring, some of which are being worked."

At Island Falls, 18 miles east of here, Mr. Proudfoot is sinking two shafts with a gang of six miners, and I hear the prospects are very bright. Between this point and Lake Harold (west of this), James Hammond, for Folger Bros., of Kingston, is prosecuting work on the veins which show considerable merit. Nearly all the development so far is in the so called protogene formation, though a few of the veins are at the contact of that rock and the green schist.

Our mining camp is on the shore of this lake, beautifully situated. The lake is eight miles long, by about 1½ wide, abounding in whitefish, trout, pike and pickerel, with plenty of game. To see a moose is no uncommon occurrence. Our boys had a great chase after one in a canoe the other day just opposite the camp; they caught him but of course as there is a law against it "we didn't do anything with him."

### British Columbia.

#### Slocan District.

The decision of Justice Walkem in the Monitor case (Wills vs Petty), gives a good precedent for the non-validity of verbal promises, or alleged promises, to share interests in mining claims. The Monitor has had a short but interesting history. It was discovered upon the side hill opposite Three Forks during last summer by Geo. Petty. An option carrying \$30,000.00 for 30 days was given, \$500.00 being paid down. This option was not taken up. With the \$500.00 as a start Petty began to ship ore, and the late prospect became a nice paying little mine. As soon as this was accomplished more or less claims of being "in on it" were preferred; and these, it is satisfactory to observe, have been decided as of no avail. The case is, however, carried to appeal at the Supreme court of British Columbia.

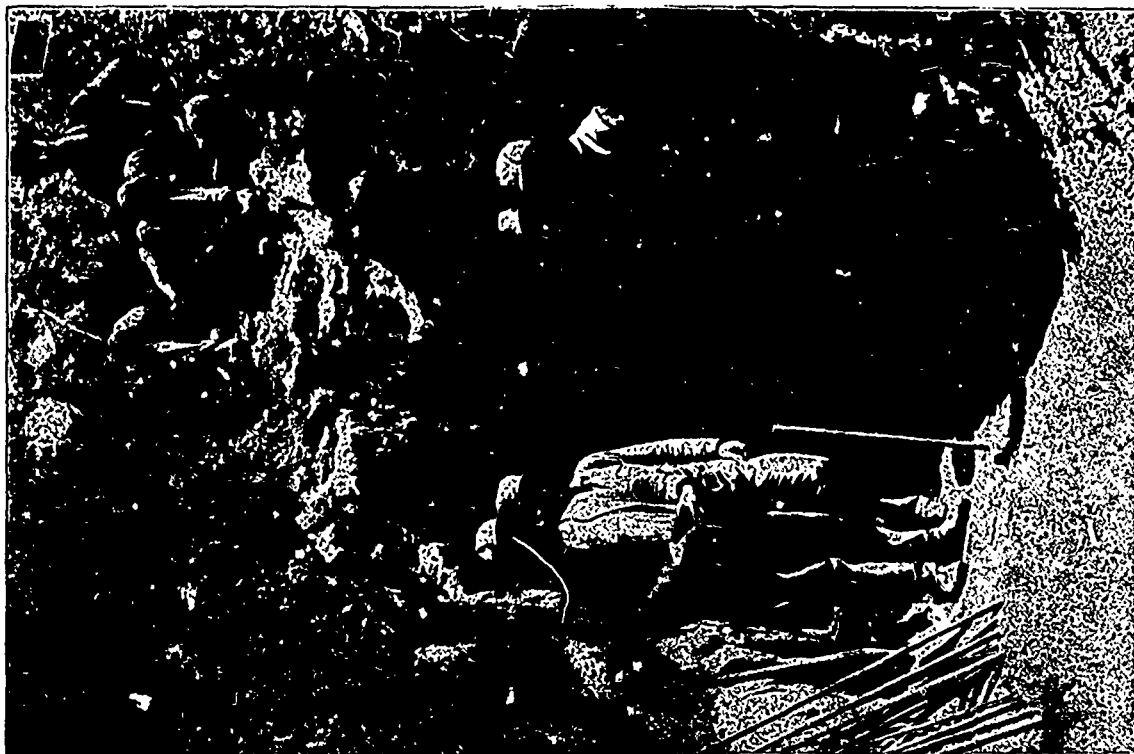
The matter is one of great moment to prospectors. Their partnerships and grub stake agreements are of the loosest kind. A man easily gives interests in his future prospects, but after spending hard work and money on proving them worth holding, he is inclined to let his friends who are "in on it" and who have not done a stroke of work, carry their case to court, especially if the arrangement is not on file.

The usual practice in prospecting in West Kootenay is to prospect in twos and threes. Each man stake in his own single name and then record transfers of an even share with his partners, in his and their claims.

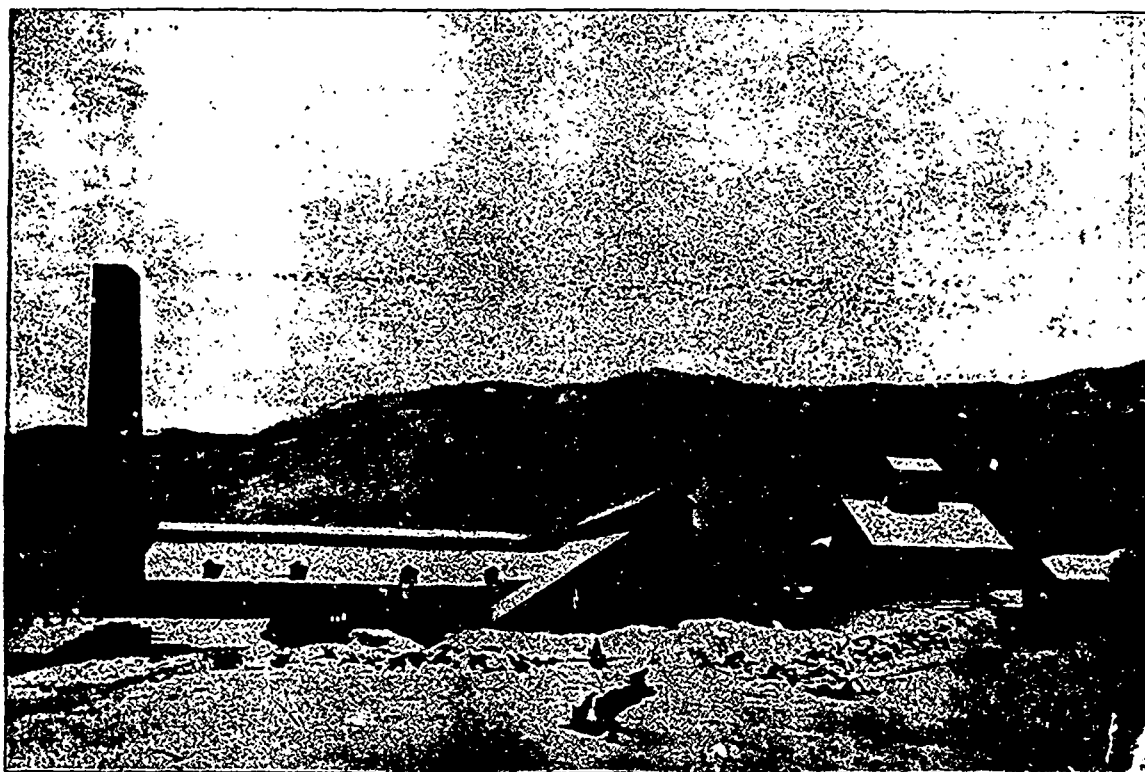
The Noble Five group of mines have been the subject of much attention in the past, especially in the matter of experts, capitalists and litigation. The latest report is that this group, together with the adjacent "Deadman," will be incorporated as the Noble Five Consolidated Mining and Smelting Company, with \$1,200,000 capital stock. The trustees are, John G. McGuigan, Robinson M. Sherman and James B. Jones. It was only a month or so ago that the Gooderhams of Toronto were expected to take up this property. It is another Slocan mining property gone to our friends on the other side.

Several experts have been busy looking over the dry ore prospects of the southern Slocan of late. A little English capital is coming in and considerable bonding has been done by western or Pacific coast Canadians. The stocks put upon the markets of the coast cities seem to have stimulated speculation in that quarter. However the great majority of Slocan mines are in the hands of close corporations at present, and of these a respectable number are still owned by the original locators, which says much for the district being a poor man's camp.

Cariboo Creek prospects are looking up a little this summer. Several properties have been bonded, and considerable prospecting and assessment work is being carried on. The veins are usually pyritic and are well defined and of good size. Cariboo Creek mining camp is some 20 miles west of Slocan lake. The formation is slate and schists. The country intervening, from Slocan lake, west, to the head of Cariboo creek has seldom been crossed. An apparently barren belt of gneissoid granite lies back of the lake, which has so far discouraged prospecting. However, crystalline limestones are said to exist 12 miles inland and these may influence the mineralization of that region.



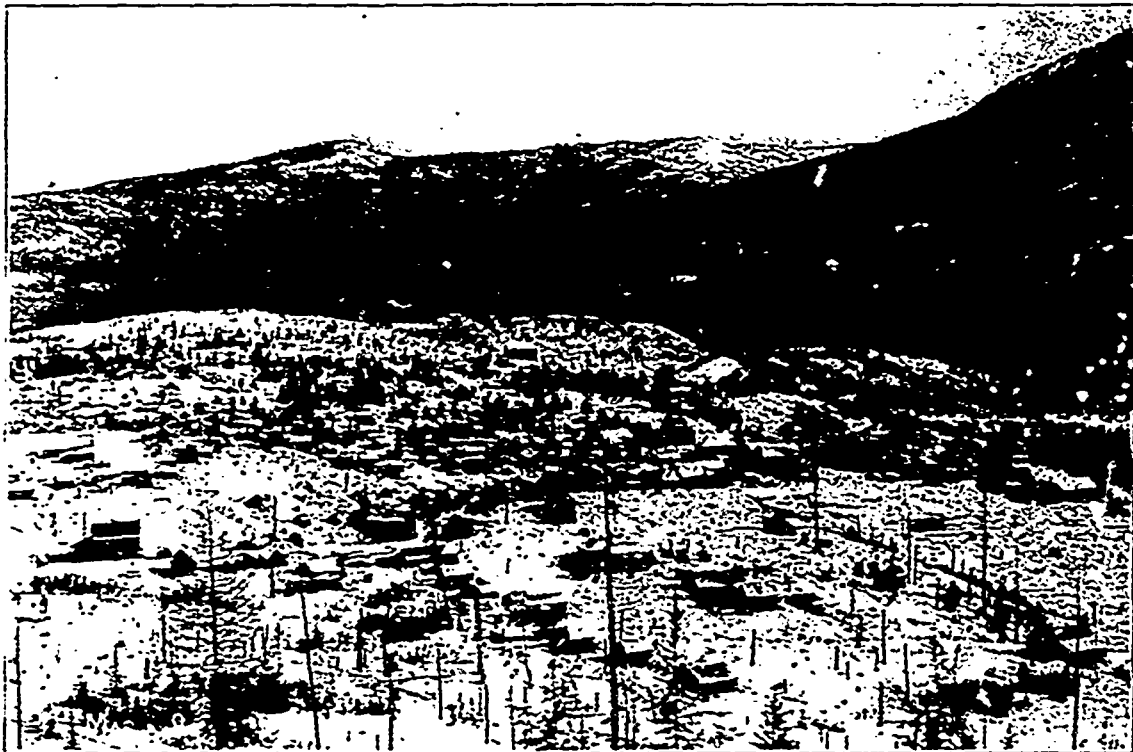
Lower Tunnel, Monte Cristo Mine.



The New Trail Smelter. Daily Capacity, 200 Tons.



Lower Tunnel, Georgia Mine, B. C.



Rosslund in Winter.

The latest improvements in the upper Slocan country are the Whitewater waggon road and the K. & S. Ry. spur up to the Slocan Star concentrator.

The Alamo concentrator is expected to resume operations about the 10th. The Slocan Star and Washington concentrators have already gone to work. There is now a concentrating capacity of 300 tons per day in the Slocan.

Under the stated new management and stocking of the Noble Five group, a concentrator and Tramway will probably be built.

The Northern Belle is now being actively developed under encouraging showings. This mine has already been a shipper.

According to the Customs returns of Nelson, and data furnished by the C. K. S. Nav. Coy., a little over a million and a half worth of ore has been so far shipped out of West Kootenay for 1896. This does not very amply justify the \$10,000,000 prediction of the early months of this year, yet there will probably be much heavier shipments during the latter half of the year, both from the Slocan and from Trail.

Waggon roads, tramways, concentrators, smelters, and a fair railway service have, but very lately, replaced the pack animal with its 250 lbs of picked ore, in fact the change has been almost entirely within the last twelve months.

The prospecting season is late. The month of May was cold. June has been exceptionally dry and hot, yet the best ground is still covered with snow. This hinders the taking up of options and bonds, also assessment work. In fact claims staked on bare ground at this date last year are at present almost inaccessible, except by man-packings.

The Washington concentrator is at present putting through about 60 tons a day. This concentrates to 20 tons, and two four horse teams take down the ore to the Mc-Guigan siding on the K. & S. Ry.

Two early pioneers of the Slocan are occupying themselves in the country south-east of Slocan lake. One of them is Eli Carpenter, the discoverer, with Seaton, of the rich Slocan galenas, and the locator of the Payne mine. He has recently made another strike. The other pioneer is Bill Springer after whom the Springer creek is named. He has been running the development on the Arlington.

#### Boundary Creek.

The Mother Lode, Deadwood Camp, has been bonded to Col. Weir for \$14,000. A preliminary payment was made and the remainder is in two equal installments, at the end of six and of nine months. The gold-bearing ore is copper pyrites with a gangue, and in some parts of the deposit, of solid magnetite, in others, of lime, pyroxenite and silicious material. A very clean contact can be traced on the west side between the ore body and the lime. On the surface the ore outcrop shows a width of over 100 feet, but no cross-cuts at a depth have been made.

The shaft on the Copper is down nearly 50 ft. It has been decided to cross-cut and drift at the 50 foot level, instead of waiting till the 100 foot level was reached, as was at first intended. A lime "horse" was encountered at twenty feet, but it was soon passed through and good ore again struck. The ore is copper oxide and glance, along with hematite in a silicious matrix.

The No. 7 shaft is down 68 feet, work has been temporarily suspended until a blower can be put in.

Numerous interests and small prospects are constantly changing hands at prices ranging from \$200 to \$2,000, but of the larger properties, with the exception of the Mother Lode, none have, during the last month been sold.

Mr. Wulffsohn, of Vancouver, representing large English capital, and Mr. J. H. Clemes, mining engineer, of London, are in for an extended examination of the camps. So far they have examined the Sunset, Deadwood camp and the quartz properties of Long Lake.

The northern limit of our mineral belt is being gradually extended. Within the last month numerous and extensive bodies of pyrrhotite, with copper pyrites, have been discovered north east of Long Lake, along what is known as Pass Creek. The surface gold value per ton is only a few dollars, but it is probable that development will show ore of a higher grade.

We are pleased to see that Eastern Canadian capital is beginning to come in. Mr. T. A. Garland and Mr. Hayes of Portage LaPrairie, have secured interests in several properties here—notably the Jewel and Gold Drop, Long Lake camp, also Mr. McArthur, of Winnipeg, is in looking for investments.

The Winnipeg sale, which was being negotiated by Spokane parties, has apparently fallen through. If satisfactory arrangements could be made with the owners, there is, in the opinion of the writer, no better investment for good Canadian capital, than this property. A careful report upon the property by a competent person, coupled with the great name it has already acquired, would cause its stock (if placed upon the market by solid reputable persons) to be eagerly taken up.

Mr. Pettie, the well known English expert, who formed the Alaska-Treadwell Company, will be in the district in a few days.

#### Quebec.

A fine strike of long fibre of very superior quality is reported from the mines of Messrs. King Bros., at Thetford mines. A cyclone mill has lately been added to the plant to work on dumping material. At the Johnson's, Bell's and American companies, a good deal of activity in mining is noticeable. The demand for the

mineral continues to improve, and there are indications that prices will take an upward tendency. The United Asbestos Co. is doing some work at Broughton. Mr. W. T. Costigan, of Montreal, is reported to have been appointed to the management of the Glasgow and Montreal companies mines at Black Lake, which are to be reopened and worked.

The North American Graphite Co's mill is running full time.

There is nothing new to report from the pyrites mines at Capelton.

The demand for mica continues to be fairly good, and there is some activity at the Wallingford, Blackburn and McLaurin mines in Templeton. A good deal of scrap mica, formerly thrown away, is now being utilized in the manufacture of boiler coverings, roofing material, etc. The principal consumers at present being the Mica Boiler Covering Co. of Toronto.

## CANADIAN COMPANIES.

**General Mining Association, Ltd.**—The following is the report of the directors and accounts submitted to the shareholders on 1st May last: "The directors present to the proprietors their annual report, together with the accounts for the year ending 31st December, 1895, and regret that, in consequence of its having been necessary to remove to new offices, they have been compelled to fix the general meeting for a later date than usual.

The sales of coal were as follows:—

	1896. Tons.	1895. Tons.	Decrease. Tons.
Sydney mines . . . . .	223,645	236,125	12,480
The profit on the year's trading, as set forth in the accounts, amounts to . . . . .		£17,040	15 7
Brought forward from 1894 . . . . .		459	1 0
		£17,499	16 7
Out of which the directors propose a dividend of 12s. per share, free of income tax, viz . . . . .		16,481	8 0
Leaving balance to carry forward . . . . .		£ 1,018	8 7

The report of Mr. R. H. Brown, manager of the colliery, states:—

"The average number of colliers employed during the season was 295 men; the pit worked 277 full days drawing coal; and the total quantity of 253,969 tons of coal was raised. The best month's output during the season was made in October, when 27,061 tons were raised.

Only 12 cargoes of coal were shipped before the 1st of May, but we then commenced the regular season's work, with 50,700 tons of unscreened coal on bank. The largest month's shipment was made in July, when 34,160 tons of coal were put on board vessels.

The total shipments for the year were 208,895 tons, and the local sales 14,750 tons of large, run-of-mine and slack coal.

The great length of our north side underground engine plane, now upwards of a mile from the pit bottom to the landing, has been restricting the output therefrom, while only one trip of tubs could be run at a time. To obviate this, we have, during the year, completed another plane, contiguous to, and parallel with, the first; this allows the simultaneous running of two trips, the empty trip running down while the full trip is being drawn up; by this means the capacity of the hauling engine and the output are both increased.

A small compressed air plant has been erected during the summer—for the purposes, firstly, of pumping out the water which had accumulated at the lowest places of the north side workings; secondly, of pumping to the shaft bottom, the large body of water remaining in the district, which had to be flooded to extinguish the fire therein, in 1885; and thirdly, of making a trial on a small scale, of the cutting of coal by machinery at this colliery. The plant consists of an air compressor, having cylinders of 14 inches diameter, by 18 inches stroke; a multitubular boiler, three air receivers, about 2,569 yards of wrought iron air pipe, two small duplex pumps and two coal cutting machines. The compressor also supplies the power to a small winch, which by drawing up the tubs of coal from the deep places to the engine plane, does the work of three or four horses. The advantages of a motive power which can be successfully applied as a substitute for horses, at a distance of a mile from the shaft bottom, and which, at the same time, adds to the coolness and ventilation of the colliery, can scarcely be over-estimated. The coal cutting machines have been in operation only for a short time yet, but they seem to promise satisfactory results.

A small quick-running engine and two tubular boilers were procured and placed at Queen pit, for working the Murphy 10-foot diameter ventilating fan, which was set up there during the previous year.

The efficiency of our Guibal 30-foot diameter fan has been increased this season, by the addition thereto of the anti-vibration shutter, imported from England for the purpose. New blades have recently been put on this fan, in November last.

About 1,400 lineal feet of the pitch pine sliding spears in the main winding shaft, which were getting worn, have been replaced by new.

The pit head frame and pulley legs at the pumping shaft, when the workmen are lowered into and raised from the mine, were failing; they have, this season, been replaced by new structures, made of pitch pine.

There being a scarcity of water for domestic purposes owing to the dryness of the season, in August we put down a borehole in the vicinity of Queen pit, to a feeder of good water known to be there. The hole is 5 inches in diameter and 155½ feet deep, and yields about 8 gallons of water per minute. This, with the other borehole put down during the previous summer near our old pit yard, will, it is confidently hoped, provide an ample supply of pure water for the use of our workmen and others during the driest seasons.

In the month of May 60 coal cars of six tons capacity each were purchased from the Dominion Coal Company; and to enable us to keep our railroad open during the winter months, a snow-plough has been provided.

Ten new cottages of improved design for our workmen have been constructed during the summer, and a good deal of work was done in repairing many of the workmen's houses which are getting old.

The superstructure and tréfle work of our eastern pier, at the loading ground at North Sydney, has been replaced by new of increased height, and provided with new drop and shutes for shipping the coal. The approach to this pier over the public



road has also been renewed, the side walls enlarged, and rolled steel girders, with pitch pine supports, have been substituted for the oak stringers hitherto used.

One breakage occurred during the season to our main pumps. One of the large pine spears broke in the lower set of pumps, which, after a few days' work, we got successfully replaced by a new spear.

A number of the sleepers on our railroad have been renewed; the locomotives and rolling stock have been kept in repair, as also the several stationary engines. Considerable repairs had to be done to a number of our boilers, some of which have been in use for a number of years.

The colliery plant generally, may be said to be in very good working order.

The accounts for the year are:—

LIABILITIES.		£	s.	d.	£	s.	d.
To share capital, viz., 27,469 shares of £5 10s. each . . . . .					151,079	10	0
" Sundry creditors—							
At the mines . . . . .	3,162	18	5				
At Halifax . . . . .	1,899	17	7				
In England . . . . .	979	11	11				
Unclaimed dividends . . . . .	329	6	0				
" return of capital . . . . .	709	0	0				
					7,080	15	11
" Reserve —							
Per last account . . . . .	£29,850	0	0				
Added this year . . . . .	1,550	0	0				
					31,400	0	0
Maintenance and Renewal Account—							
From 1894 . . . . .	£40,250	0	0				
Sydney mines for current year . . . . .	1,500	0	0				
					41,750	0	0
					73,150	0	0
Low Point, Barraçois and Lingan Mining Co., balance subject to collection of book debts . . . . .					2,032	2	5
" Profit and Loss—							
Balance from 1894 . . . . .	459	1	0				
Profit this year, per account B . . . . .	17,040	15	7				
					17,499	16	7
					£250,842	2	11

ASSETS.		£	s.	d.	£	s.	d.
By Property of the Association, viz—							
Pits, railways, engines, wharves, buildings, machinery, &c. . . . .	124,595	7	0				
Other property, including real estate, stores, mining implements, &c., valued per inventory . . . . .	43,172	18	6				
					167,768	5	6
" Sundry Debtors—							
At Halifax . . . . .	20,874	3	3				
At the mines . . . . .	2,722	2	7				
					23,596	5	10
" Bills Receivable—							
In England . . . . .	8,000	0	0				
In Halifax . . . . .	7,441	6	1				
					15,441	6	1
" Government and Indian Securities . . . . .	38,438	4	3				
Accrued interest thereon . . . . .	432	13	1				
					38,870	17	4
" Cash—							
At Halifax . . . . .	1,152	7	2				
At the mines . . . . .	402	18	10				
At London bankers and office . . . . .	3,610	2	2				
					5,165	8	2
					£250,842	2	11

PROFIT AND LOSS ACCOUNT.		£	s.	d.	£	s.	d.
Dr.							
To Coal stock on hand 1st January, 1895 . . . . .					267	16	3
" Sydney colliery general working expenses, railroad expenses, shipping charges, royalty, &c. . . . .					63,999	15	8
" Maintenance and renewal of plant, railroad, wharves, &c. . . . .					1,500	0	0
" Management expenses at Sydney mines . . . . .					1,697	9	10
" Income tax (average of three years) . . . . .					368	12	0
" Expenses of management in London—							
Directors' salaries . . . . .	900	0	0				
Secretary, clerks and auditors' salaries . . . . .	720	0	0				
Office rent, printing, advertising, stationery, telegrams, postages, travelling and petty expenses . . . . .	360	11	1				
					1,980	11	1
" Legal expenses . . . . .					70	19	2
" Balance—profit carried to account A . . . . .					17,040	15	7
					£87,125	19	7
Cr.							
By Proceeds of sale of 223,645 tons of coal and miscellaneous receipts at Sydney colliery . . . . .					83,514	5	3
" Rents of cottages and lands . . . . .					1,264	8	11
" Interest . . . . .	1,889	11	7				
Less interest paid and exchange . . . . .	385	3	4				
					1,504	8	3
" Transfer and other fees . . . . .					5	7	0
" Profit on real estate sales . . . . .					94	11	1
" Stock of coal 31st December, 1895 . . . . .					742	18	7
					£87,125	19	7

California Gold Mining Co. has been formed with an authorized capital of \$2,500,000, to acquire and work the California mineral claim in the Trail Creek gold mining district of British Columbia. Officers: Rufus H. Pope, M.P., President; O. C. Labaree, Rossland, Vice-President; J. P. Graves, Spokane, Sec.-Treasurer; Trustees: Hon. W. B. Ives, M.P., R. H. Pope, M.P., O. G. Labaree, J. P. Graves, W. A. McDonald. The property contains about fifty acres, and is situated on the south slope of Red Mountain, Trail Creek.

Notes on Dynamite.

Mr. Harry A. Lee, Commissioner of Mines of the State of Colorado, contributes the following:—

Under the most favorable conditions the manufacture of dynamite is a hazardous business, safety being entirely dependent upon the purity of materials used and the skill and care of the workmen employed. In the manufacture of explosives, as in all lines backed by American ideas and energy, the American product stands pre-eminent. Although the first plant was established in this country only a little over twenty years ago, the art has to-day reached that point of perfection, brought feats of engineering within the range of possibility and exerted an influence upon modern civilization, which entitles it to take rank with the application of steam power.

The aim of the various powder companies is to supply a product which can be transported and handled with safety, which will give uniform results in blasting, keep in good condition when properly stored, and, as far as possible, neutralize all poisonous fumes when exploded. The explosives used almost universally throughout Colorado are compounds having nitro-glycerine for a base, commonly called by the miner "30 per cent. powder" or "60 per cent. powder," according to percentage of nitro-glycerine in the mixture.

The strength of the American nitro powder is not, as is generally supposed, wholly dependent for force upon the amount of nitro-glycerine present in the mixture. The compound is composed of various elements which in manufacture not only absorb the desired amount of nitro-glycerine, but are in themselves an explosive. In blasting, the exploder or cap, which is charged with fulminate of mercury, explodes the nitro-glycerine, and the nitro-glycerine, in turn, the remainder of the mixture. A line of experiments, conducted by experts, shows that the force exerted by this combination exceeds that of the sum of the three exploded separately.

The American dynamite of to-day is not an accident, but is the result of a long line of careful experiments, conducted by eminent chemists, and demonstrated by practical tests. These tests, aided by great advances in the art of manufacturing, have demonstrated that the products can be handled with greater impunity than many other things common to transportation by common carriers. They have also demonstrated that the safety of the compound is dependent upon purity of materials used and care in mixing. During the past few years competition among various powder companies has been so keen and bitter that gradually but steadily the cost of dynamite to the consumer has been reduced. It is a dangerous contest, and a rivalry in which, sooner or later, if continued, safety will be sacrificed. To be more explicit on this point—skilled labor commands a certain price, likewise chemically pure nitro-glycerine, the two being the most expensive parts in the compound of dynamite; combined the product is a safe mixture. Unskilled labor and impure nitro-glycerine can be had for less money, but the product of this combination is a mixture subject to decomposition. Decomposition in such a compound is practically explosion. Decomposition may not set in for some time, and the great danger of the competition, in the manufacture and sale of dynamite, is that of forcing some of the competitors to use impure or cheaper materials and labor, in order to meet a lower price, and take chances upon decomposition not commencing before the stock thus manufactured is disposed of. This danger point may not as yet have been reached. The older powder companies have much invested and a reputation to maintain; the newer companies have much invested and a reputation to make. From the standpoint of safety, however, the bottom price is very little below the market price of to-day.

Powder should be stored in a dry, cool and well ventilated magazine built for that purpose. A brick or stone magazine is preferable to a frame, both on account of being affected less by sudden changes in temperature and freed from any danger of bullets from careless marksmen. When built of wood the frame or studding should be covered inside and out with boards, and so set that the air can circulate all around, and the inner boards be but little affected by the heat of the hot sun.

Caps should not be stored with powder. Regarding the age of powder—when powder has had proper care in manufacture and storage, decomposition will not set in. If there is no decomposition there is no chemical change, and under these circumstances powder ten years old or older is just as good and safe to handle as powder ten days old.

One of the main sources of accident is from thawing powder, and the only safe plan is the use of heat from hot water. The powder should not be dipped in the water but placed in a water-tight vessel and the vessel set in hot water, or a regular powder warmer should be made. These vessels can be obtained from any of the mechanical firms or from the powder companies at nominal cost. Do not place powder under or on a stove, or in the oven. Do not lay on boiler wall or on back plate of a boiler. Do not heat around a blacksmith forge, or over a burning cauldron. Do not lay on hot sand, or, in short, do not thaw powder with dry heat. Do not consider these precautions unnecessary, or reason that because you have done so many times there is no danger. An explosion is usually fatal, and numberless escapes in no manner reduce the explosive force.

Powder freezes at from 30° to 44° F., explodes, when confined, at from 320° to 360° F. From a quick application of dry heat, powder is liable to explode at 120° F. A stick of powder heated to 120° F. can be held in the hand with little inconvenience, and this degree of heat is soon reached when placed under or above a stove.

That frozen dynamite is liable to explode from heat quickly applied has been demonstrated many times, and to ignorance, non-appreciation, or carelessness of this fact, most accidents are due. If you have heated powder about a stove for years without harm, consider yourself fortunate and stop it. If the warning of those who make the powder has no effect, let the accidents constantly occurring from this cause convince you. If you cannot procure a powder warmer, take a 5-lb. lard bucket, fill it with powder, and set in warm water. If you have no warm water, put some sharp rocks in the bottom of a larger vessel to keep smaller vessel off the bottom, surround the inner vessel with water and set two lighted "snuffs" about an inch long under the big can, throw an ore sack over the whole, and in a short time the powder is in good condition for use and no risk has been incurred. With slow heat thus applied, dynamite may be heated to temperature of boiling water with safety. Do not use frozen powder to load a hole. It is unfit for use. If it explodes at all it will do poor work. If it does not seemingly burn or explode, it may be smouldering or decomposing, and the dropping in of a spoon, a drill or the stroke of a pick or hammer may be sufficient to explode what is left.

Constant care in preparing charge and loading will avoid "missed holes." Next to warming powder with quick, dry heat, "picking out a shot" is the cause of the most fatal accidents. If a hole "misses" do not be in a hurry to return, and especially if the hole was tamped close. More accidents are caused from supposed missed holes than from actual. A small, sharp rock may be tamped into a piece of fuse, so that the fire will not pass that point for hours; this is often mistaken for a "missed hole." The hole is picked out, this particular rock removed, and an explosion follows. To fully demonstrate this, put some V-shaped clamps on a piece of fuse and see how long it will take to burn by certain points. Long after the fuse is supposed to be out, loosen the clamps and see how quickly it will "spit" at other end. Some holes do miss fire and have to be picked out. In these, great care should be exercised to clean down not nearer than 5 inches from cap, then reload with another charge, and, instead of using a small piece of powder, use plenty. A heavy charge on top may destroy the effectiveness of the lower charge, but it will explode it and get rid of a bad job. If the "collar" of the hole is simply blown off and the lower charge has not broken to the bottom of hole, do not drop in a drill or spoon to see "how much hole is left"; leave it alone as long as possible. The lower powder may have frozen, and all may not have been consumed.

Caps are charged with fulminate of mercury, one of the most violent explosives, and one of the most unstable chemically, and may explode from the slightest jar or least amount of friction. The caps at all times should be stored well away from the powder and at no time in or around a miner's pocket.

Powder should under no circumstances be stored underground. Poor ventilation with damp air will produce decomposition and decomposition explosion. There is practically no danger in transporting powder in cases; and especially when frozen. Even well thawed powder will not explode from any of the jars occasioned by wagon haul or pack train. A case dropped several hundred feet upon rock might explode, but separate sticks would simply break out of the wrapper and no explosion follow.

### The Legitimacy of Mining.\*

E. D. EDGERTON.

If the question as to whether mining is legitimate or not were submitted to any of us individually, or to those assembled around this board collectively, it is doubtful if there would be any other than a unanimous, affirmative answer. And still it is more than likely that fully 90 per cent. of the individuals giving this affirmative answer would recognize in their past experience and the observations that have come under their notice that a large portion of the entire world that is without and beyond the immediate confines of mining districts would give either a negative or an evasive answer to the question.

Years of experience in connection with mines and mining operations have fully convinced me of the entire legitimacy of mining. At the same time I have been persuaded that this view is not generally entertained by the moneyed and investing world. For years past it has not been a safe proposition for a western man to allow his eastern bankers to understand that he had much, if anything, to do with mining. Even the banks located in mining sections have had to be extremely careful not to allow it to be understood by their eastern correspondents that they had mining accounts. Until within the past year it would have been impossible in the large cities of the east to get any considerable proportion of the business men connected with financial matters, particularly banks and trust companies, to admit for a single instant that they were connected with any mining operation; and, indeed, you were a fortunate individual if you could get their attention sufficiently enlisted to warrant a thirty minutes' conversation upon the subject in any form whatsoever. They simply raised their hands in holy horror. Men who could coolly stand by and see the depreciation of fifty millions in the stock of a single railroad, and who could see the fortunes of a lifetime swept away from five hundred different homes and call it business, and the following day advance margins upon the collaterals that have been twice wrecked during the past week and still call it business, frowned with unswerving severity upon anything that bore the name of that rankest of rank uncertainties answering to the common denomination of mine, or mining.

This is not a theory, but a condition which the individual experience of many of us could vouch for. Now, where there is such a universal condemnation there must be a cause. Few were the men of any considerable means and business experience in the large cities who had not at some time or another in their past life had some experience with mining or mining schemes. There was scarcely a village or hamlet from the Missouri eastward to the Atlantic that had not at some previous time later than '49 been approached by the seductive smiles, the winsome manner and the beguiling tongue of the mining promoter. And reluctant as we may be to admit the fact, truth compels us to say that in 90 per cent. of these various experiences of hamlets and individuals the results had not been satisfactory. This does not in any way, in my opinion, militate against the business of mining, but it is a sad reflection upon the manner in which mining and mining schemes have been conducted. It would not be wise nor proper, in the brief space that is allotted me, to attempt to go into the details, by way of explanation, showing where in some instances incompetency of management, in others lack of funds, in others lack of intelligence, and in not a few cases actual rascality, have been the primary causes of these failures. It is enough to make the assertion, and in making this assertion we come face to face with the prominent feature of the proposition presented by the term, "legitimacy of mining;" and in the further discussion of this subject let us pause to consider what the effect of the admitted facts are upon the present and future, assuming for the sake of argument that the statements that I have made are literally true.

In the first place we are met with the proposition that more failures in mining occur through the lack of money for the proper development and placing of machinery than from all other causes combined. Inadequacy of capital is the breaker that has shipwrecked more mining ventures than all other causes. It may be laid down as a perfectly true, and I believe undisputed, proposition in a new country, and particularly in trying to solve the problems that confront the mining operator of this northwestern country, the necessity for additional capital is paramount. It may come in various ways; it may take the form of interesting partners of local reputation; it may be credit at the local banks; or it may take, as is quite usual, the form of interesting outside capital, which is but another name for floating a mining scheme or selling a property in non-mining sections of the country to capitalists.

Let this northwestern country once have solved the problem of securing the adequate money to develop and carry forward the mining work that lies before it, and you have transformed it with resources that will make this lovely city of Spokane not only a second Denver, but a doubly discounted Denver. Now, how can this best be done. In my opinion it all turns upon the one simple question of conducting our mining operations so that they will stand the test of legitimacy as a matter of fact;

also, so that the world will recognize them as legitimate. In short, what we want is confidence; not confidence in ourselves, but the ability to create confidence in those who have money and are willing to back us in our operations.

I am not one who believes there is any lack of money. I would rather take the position of the old farmer who said "there was a great scarcity of collateral."

Just now the whole world—and for several years past it has been the same—is raising the cry of want of confidence. It is not necessary to go into a discussion of this subject even in a general way, but nowhere is it felt more potently and perhaps more deservedly than in mining operations. I do not believe there is any trouble in getting all the money that is necessary to carry forward any business that is recognized as legitimate, at less interest than ever before. All that we need to do is to convince parties having capital that the business represented is legitimate.

It would be unkind for me to take more of your time on this occasion by going further into the details, but having roughly hewed out these few lines, permit me in conclusion to say to this convention here assembled: First and always, let your efforts be to so conduct and carry forward the business of mining that there shall be no question as to its legitimacy and there will be no question as to the results.

### Mine Discipline.

Coal mining is necessarily a more dangerous calling than the average, but it requires only a glance at any of the reports of the various state inspectors of mines to convince the reader that its necessary dangers are greatly increased by the distressing lack of proper co-operation on the part of the workmen with the efforts of the employers to provide for the safety of human life and limb. It may seem a very small matter to John Hodge, miner, that he concludes to take out a few tons of coal easy to mine and handy to load, although orders have been given by the mine boss that it be left untouched. Similarly Evan Evans, company man, having work to do in the neighborhood of a door, finds that it gives him trouble to keep opening and shutting it during the prosecution of his work, and decides that it is mere crankiness on the part of his superior officer to insist on its being kept closed except when open for the passage of men and mules. So when the foreman's back is turned he may proceed to do as suits his personal comfort best. The unfortunate results of a fall of roof at an inopportune moment or of a disarrangement of the ventilating current producing an accumulation of gas and an explosion are not surprising under such circumstances.

It must be admitted that in days gone by many an accident has been due to lack of knowledge on the part of operators. Worse than that; lives have been sacrificed by the criminal neglect of employers who knew better, but who had rather risk the lives of their employees than spend the money necessary to render the workings and appliances secure. Those days are happily behind us now, and it is safe to say that, thanks to the beneficent effects of the mining laws of the various countries and states, technical knowledge and a proper consideration for the safety of their laborers on the part of the operators is the rule and not the exception. Probably in nine times out of ten nowadays the provisions made for the protection of the men while at work are sufficient for any known contingency. Foremen and bosses and under-bosses and fire-bosses give a supervision that goes a long way toward counteracting the tendency to carelessness on the part of the workmen. But it has been proven on more occasions than one that even this close supervision by itself will not answer without a due regard for their own welfare being had by the employees themselves. It is passing strange that so many of them cannot seem to realize the importance of obeying the orders of the foreman. The welfare of the whole force depends on orders being properly carried out, and surely the fact that not only his own safety, but also that of all others in the mine, depends on the maintenance of strict discipline should have a greater effect than it does on the conduct of the underground worker.

In the beginning the mining laws were aimed at correcting the evils arising from ignorant and incompetent management of the mines. As matters began to mend in these respects the laws went further until in England and in some of the states, these laws now contain specific rules for the miners and underground workmen in general, these rules having penalties attached for their violation that are more or less strictly enforced. In the states that have not yet incorporated such regulations in their laws the need of so doing is being felt, and they will be added, let us hope, soon. A set of general rules can be made so as to fit the majority of cases likely to arise anywhere. But as an additional safeguard, special rules may be provided for to meet the local conditions of each colliery. Such special rules having been framed and adopted by the operator and having received the approval of the inspector of the district, are then to have the same force as if they were part and parcel of the mining law.

The intention of all mine laws and general and special rules is of course to render the work of the miner as safe as possible, and to maintain the necessary discipline every transgressor should have meted out to him the punishment to fit the crime. Unless the rules be enforced to the letter they are of very little value, and right here is where much of the trouble comes in, and where the mine officials as well are to be blamed. For a violation of a rule may often be attended by no serious consequences, and through a mistaken sympathy for the workman and those dependent on him the offence may be allowed to go without other rebuke than a verbal one, or perhaps left entirely unnoticed. This is wrong. The bars once let down, the whole fence of rules and regulations become valueless. Officials when besought to think of an offender's innocent family, should not fail to remember the equally innocent families of the many men whose lives were put in danger by the breaking of the rules. The greatest good to the greatest number is a principle that should be applied in such cases.

When the infraction of the law is one to be brought before the courts, punishment is perhaps even less likely to be had than when the offence is only one to be handled by the mine officials. For the eloquent attorney has a chance to ring in the wife and helpless children, and this is usually too much for the twelve men good and true who have the settling of the case. But it is believed that the tendency is towards a stricter code of rules and a more stringent enforcement of them. In the mining countries of England fines and imprisonments are of common occurrence, sometimes against operator, sometimes against workman.

The value of the strict discipline enforced in British mines is shown by the statistics of the mining industry in that country for the last forty or fifty years. In 1850 the first mines regulations act was passed. Several others have been enacted, each more strict than its predecessor. The early figures show that there was a yearly average of one fatal accident to every 233 employees; while in recent years, thanks largely to those features of the laws requiring strict discipline, the fatalities have decreased to but one for every 533 workmen.

### Illuminants Used in Mines.

At a meeting of the Chesterfield and Midland Counties (England) Institution of Engineers, Mr. A. H. Stokes, H.M., Inspector of Mines, read a paper entitled "Photometric Value of and Notes upon Various Illuminants Used in Mines," of which ad-

\* Delivered at the meeting of the Northwest Mining Association, February 22, 1896.

vance copies had been provided, was verbally introduced by the author. He said that his object in making the experiments recorded was to determine the relative amount of light obtained from the illuminants used in mines; to state their economic value; to point out certain adjuncts used for increasing their light; and to call attention to defects and dangers which occasionally accompanied their use. Experiments were made to ascertain the light intensity of safety lamps and candles, when compared with a standard candle; safety lamps and candles had also been compared with each other. Comment was made on the misleading compound names given to oils, in some cases adopted to indicate a vegetable extraction, while, in fact, it was a low-flashing mineral oil. The flashing point of petroleum varied considerably; it should not have a lower flashing point than 73 degrees Fahr., but in one sample the flashing point was 75 degrees Fahr., while another sample flashed at 58 degrees Fahr. Under the petroleum Acts, legal regulations with respect to the sale of petroleum required that any mineral oil of a lower flashing point than 80 degrees Fahr. should not be used. In the experiments, two descriptions of candles were used, viz., common tallow and wax composite. Thirteen series of experiments had been made, in most of which the intensity of light given by a standard sperm candle burning 120 grains per hour was compared with the light obtained from various oils and mixtures of oils specified, burnt in well-trimmed Marsaut safety lamps covered with one or more gauzes, and with the same lamps uncovered; also with tallow and composite candles of various numbers to the pound. The measure of the effect of two gauzes upon the full burning of the light when surrounded by a clear lamp-glass was noted, as detrimental to the free ingress of air to feed the flame and to impede the egress of the products of combustion. With only one gauze and a lamp-glass having one-third of its internal surface enamelled white, as a reflector, the measure of increased light in a forward direction was found in some cases to be more than double that given by the same oil and wick in the previous experiment. Comparisons of the standard candle with tallow and wax composite candles of various specified sizes showed that miners' candles ordinarily used gave a greater amount of light than the sperm candle, and generally an equal intensity with the safety lamp. An experiment with the recently-introduced Sussman portable electric lamp showed the intensity of the light to be practically the same as that of the standard sperm candle. A series of experiments with miners' candles showed the rate of burning in grains per hour, and the time occupied in burning one candle, and deductions resulting therefrom. A similar series ascertained the rate of burning of various oils. The concluding tables showed the cost of oil burnt in safety lamps, also of candles per hour and per day. It was remarked that whereas a candle was a self-contained and fully complete illuminant, the total cost of a safety lamp must include renewals, repairs, interest on capital, and cleaning; but where a large number of lamps were used it should not exceed 0.75¢ per day.

Practical suggestions were made as to the several parts of a safety lamp, such as that the wick tube for a flat wick should be corrugated on one side, and be only slightly less in width than the wick to be used in it, and an improved form of pricker for snuffing the wick was recommended. The result of the experiment clearly pointed to the conclusion that the value of an oil for illuminating purposes could best be known by actual photometric experiment. Seed oil when burnt alone had a tendency to form a crust and required frequent snuffing, but when mixed with petroleum they gave good results. The mixture suggested by the Royal Commission on Accidents in Mines was believed to be one of the safest and best illuminants that could be used in safety lamps—viz., a seed or refined colza oil of good quality, mixed with a paraffin oil of a flashing point not less than 80 degrees Fahr., in the proportion of not more than one part by measure to two parts of the vegetable or mineral oil. The object of the addition of the petroleum was two-fold: (1) To reduce the viscosity of the seed or colza oil and to increase its capillarity, and (2) to supply a mixture of hydrocarbon oil that would increase the illuminating power of the flame by rendering it white and clearer burning than when pure vegetable oil was solely used. The price of an oil did not appear to be any guide to its value as an illuminant, either in respect of light or lasting properties. Some of the cheap oils compared favorably in both respects under the same connection with higher priced ones. To obtain good light from a safety lamp, cleanliness and care must be the motto of the lamp cabin, and their full intent and meaning should be strictly enforced.

The dip of Strata met with in deep wells.—Mr. J. Francis in a paper before the last meeting of the British Association, gave the methods and results, hitherto unpublished, or incorrectly stated, of the attempt to determine the dip of strata met with in deep wells at Ware and Turnford. After rejecting various magnetic and mechanical appliances, the following device was hit upon. The boring tools were lowered with extreme precautions to prevent any torsion during the lowering, and by means of steel points connected with them, the direction of a known diameter was marked by vertical chases on the circumference of the core while still *in situ*; during the raising

of the tool no twisting occurred; a wax mould of the top of the core *in situ* was then taken, and again the lowering and raising were done without twisting. The core was then broken and lifted, and by means of the diameter marked on it *in situ*, confirmed by a known line on the wax mould, the direction and the amount of dip was ascertained. To test the method the boring was continued, and after the top of the core had been ground to a flat surface, steel punch marks along a known diameter, maintained by careful lowering and raising with the same precautions, were impressed on the surface, and again the core was broken and lifted. This observation was within a degree of the previous one; so that there is probably only a negligible error, or none, in the observations. The dip of the Silurian rock at Ware at 825 feet below the surface was 1° west of south, at an angle of 41'. Similar experiments at Turnford, carried out with rather less success, gave the dip of the Devonian rocks at 994 feet as 17° west of south at 25° from the horizon. These dips correspond with those of the Secondary rocks off the Wealden axis. The south-easterly dip which has been published for one of these instances is incorrect. Mr. Harmer, in a paper which followed advocated that the survey of deep-seated rocks by borings should be systematically carried out by the Geological Survey, the expense being provided for indirectly by the appreciation of real property, and directly by royalty, whatever success attended the operations.

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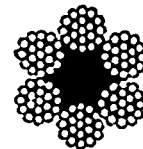
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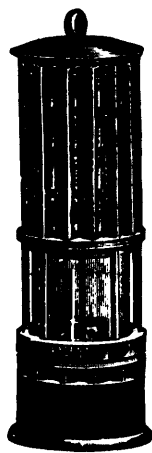
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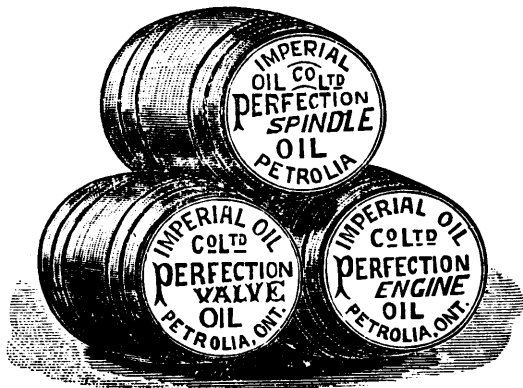
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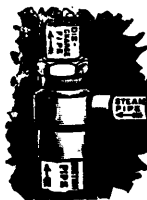
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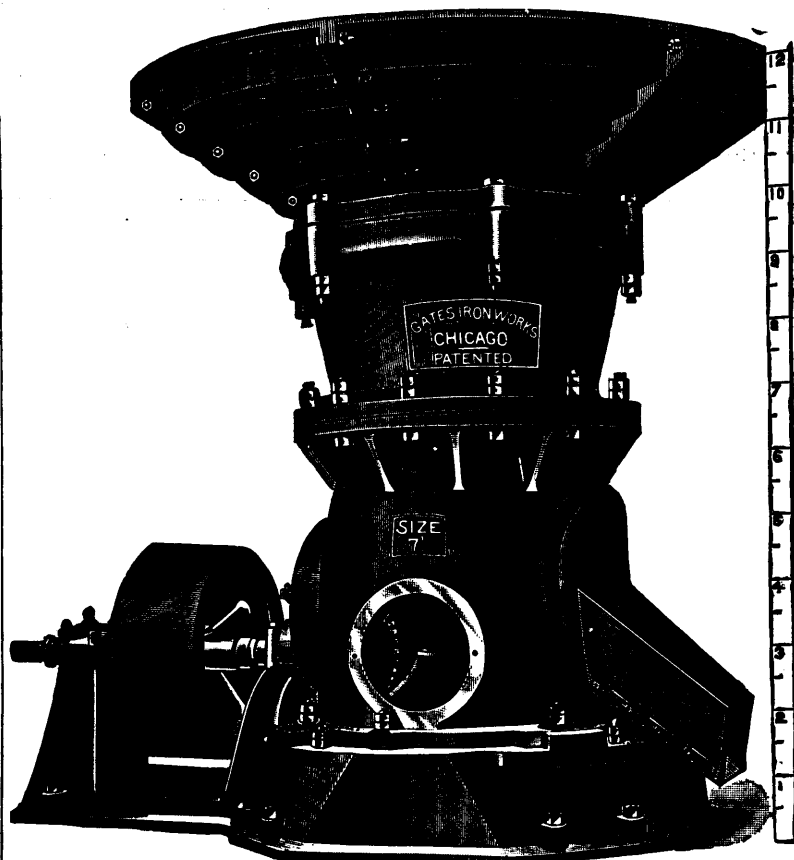
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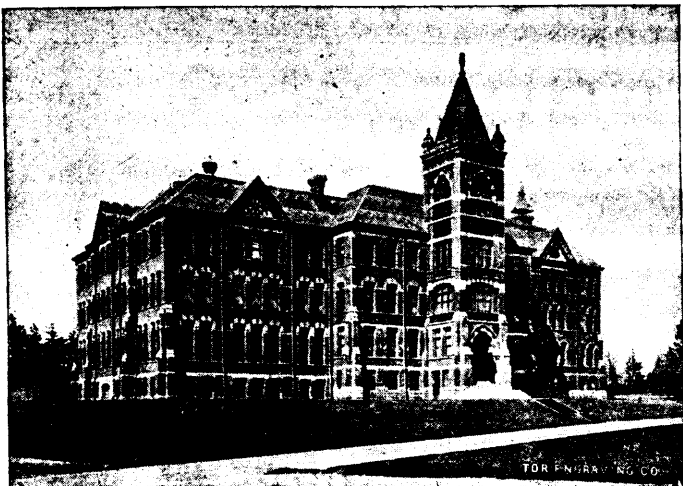
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This School is equipped and supported entirely by the Province of Ontario and gives instruction in the following departments:

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- 2—MINING ENGINEERING
- 3—MECHANICAL & ELECTRICAL ENGINEERING
- 4—ARCHITECTURE
- 5—ANALYTICAL & APPLIED CHEMISTRY

Special Attention is directed to the Facilities Possessed by the School for giving Instruction in Mining Engineering. Practical Instruction is given in Drawing and Surveying, and in the following Laboratories:

- |                |           |              |
|----------------|-----------|--------------|
| 1—CHEMICAL     | 3—MILLING | 6—ELECTRICAL |
| 2—ASSAYING     | 4—STEAM   | 7 TESTING    |
| 5—METROLOGICAL |           |              |

The School also has good collections of Minerals, Rocks and Fossils. Special Students will be received as well as those taking regular courses.

FOR FULL INFORMATION SEE CALENDAR.

L. B. STEWART, Secretary.

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# SCHOOL OF MINING,

## KINGSTON, ONTARIO.

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The following Courses are Offered \_\_\_\_\_

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- (A) Mining Engineering.
- (B) Analytical Chemistry and Assaying.

2. *Four Years' Courses for a Degree in*

- (A) Mining Engineering (M.E.)
- (B) Chemistry and Mineralogy (B. Sc.)
- (C) Mineralogy and Geology (B. Sc.)

3. *Post-Graduate Courses for the Degree of*

Doctor of Science (D. Sc.)

For further information see the calendar of Queen's University for 1894-95, p. 117.

4. *Prospector's Course.*

The School offers to Mine Foremen, Assayers, Prospectors and Mining Men generally, Special Courses of Instruction beginning January 8th, 1896, and continuing eight weeks.

5. *Extramural Classes for Prospectors and Mining Men.*

Lecturers will be sent to Mining Centres to conduct Classes in Elementary Chemistry, Mineralogy and Geology as applied to the discovery and winning of valuable minerals.

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The School is provided with well equipped Laboratories for the study of Chemical Analysis, Assaying Blowpiping, Mineralogy, Petrography and Drawing. In the Mining Laboratory recently built the operations of Crushing, Amalgamating, Concentrating, etc., can be studied on a large scale.

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The BRUCE CARRUTHERS SCHOLARSHIP (value \$200 per annum) will be awarded in May. Its object is to aid one who has had some experience in amalgamating, etc., in acquiring a good education in Mining Engineering. The conditions of the award will be made known on application to the Director or the Bursar.

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FOR CALENDAR OF THE SCHOOL AND FURTHER INFORMATION APPLY TO

**WM. MASON, Bursar,**  
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### GOLD AND SILVER.

Under the provisions of chap. 1, Acts of 1802, of Mines and Minerals, Licenses are issued for prospecting Gold and Silver for a term of twelve months. Mines of Gold and Silver are laid off in areas of 150 by 250 feet, any number of which up to one hundred can be included in one License, provided that the length of the block does not exceed twice its width. The cost is 50 cents per area. Leases of any number of areas are granted for a term of 40 years at \$2.00 per area. These leases are forfeitable if not worked, but advantage can be taken of a recent Act by which on payment of 50 cents annually for each area contained in the lease it becomes non-forfeitable if the labor be not performed.

Licenses are issued to owners of quartz crushing mills who are required to pay

Royalty on all the Gold they extract at the rate of two per cent. on smelted Gold valued at \$19 an ounce, and on smelted gold valued at \$18 an ounce.

Applications for Licenses or Leases are receivable at the office of the Commissioner of Public Works and Mines each week day from 10 a.m. to 4 p.m., except Saturday, when the hours are from 10 to 1. Licenses are issued in the order of application according to priority. If a person discovers Gold in any part of the Province, he may stake out the boundaries of the areas he desires to obtain, and this gives him one week and twenty-four hours for every 15 miles from Halifax in which to make application at the Department for his ground.

### MINES OTHER THAN GOLD AND SILVER.

Licenses to search for eighteen months are issued, at a cost of thirty dollars, for minerals other than Gold and Silver, out of which areas can be selected for mining under lease. These leases are for four renewable terms of twenty years each. The cost for the first year is fifty dollars, and an annual rental of thirty dollars secures each lease from liability to forfeiture for non-working.

All rentals are refunded if afterwards the areas are worked and pay royalties. All titles, transfers, etc., of minerals are registered by the Mines Department for a nominal fee, and provision is made for lessees and licensees whereby they can acquire promptly either by arrangement with the owner or by arbitration all land required for their mining works.

The Government as a security for the payment of royalties, makes the royalties first lien on the plant and fixtures of the mine.

The unusually generous conditions under which the Government of Nova Scotia grants its minerals have introduced many outside capitalists, who have always stated that the Mining laws of the Province were the best they had had experience of.

The royalties on the remaining minerals are: Copper, four cents on every unit; Lead, two cents upon every unit; Iron, five cents on every ton; Tin and Precious Stones; five per cent.; Coal, 10 cents on every ton sold.

The Gold district of the Province extends along its entire Atlantic coast, and varies in width from 10 to 40 miles, and embraces an area of over three thousand miles, and is traversed by good roads and accessible at all points by water. Coal is known in the Counties of Cumberland, Colchester, Pictou and Antigonish, and at numerous points in the Island of Cape Breton. The ores of Iron, Copper, etc., are met at numerous points, and are being rapidly secured by miners and investors.

Copies of the Mining Law and any information can be had on application to

**THE HON. C. E. CHURCH,**

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

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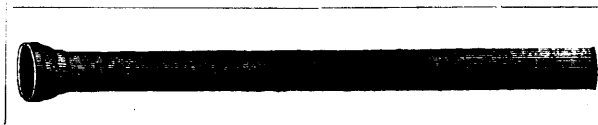
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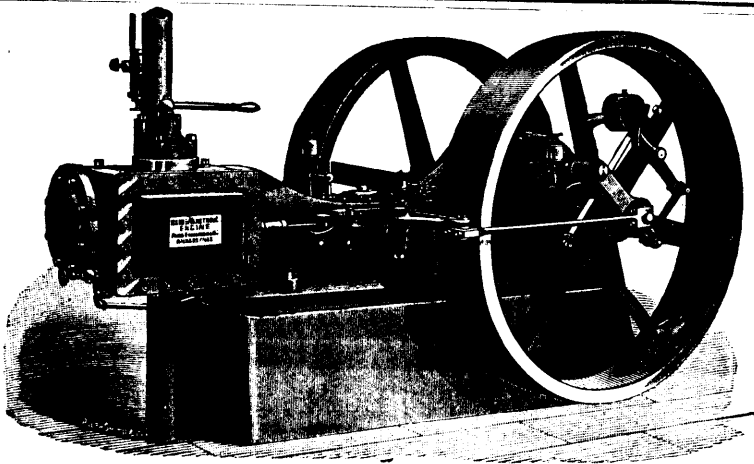
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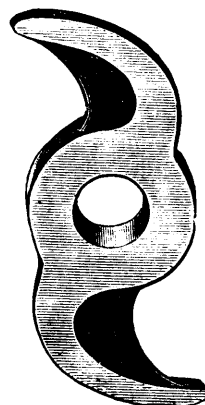
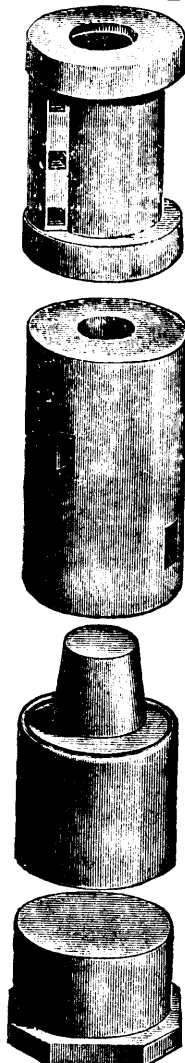
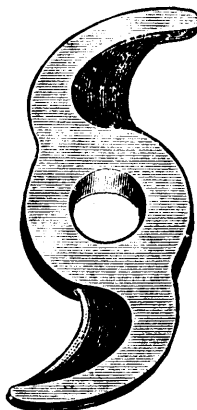
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