## Acctylenc Mine Lamps.

Since the discovery in 1892 of the process of making calcium carbide in commercial quantities at a reasonable cost, acetylene gas as an illuminating agent has been before the public in many forms and for many uses, perhaps the best known of which is the brilliant acetylene bicycle lamp which has shown its immense superiority in all points over the older forms using oil. It has recently been introduced and is meeting with success in a field where the lighting problem is a difficult one, namely, in tunnels and mines.

Various devices using oil, candles and electricity have been presented to solve the problem. Oil has many advantages—it is cheap, is easily obtainable and the men are accustomed to its use. It has, however, two serious faults. The smoke from it is often so great as to drive n.cn out of small workings, many mines requiring extra ventilation on this account. In gold and silver mines it cannot be used successfully because spilled oil interferes with the separation of the metal. From what figures are obtainable the cost of this method seems to average about 5 cents per miner's lamp for 8 hours use.

In the West, paraffin candles have been generally adopted in mines of precious metals. They largely overcome the difficulty of smoke, lessen the fire risk, and are generally more satisfactory than oil, but are far more expensive. Figures obtained from a silver mine in New Mexico may be considered as fairly representative though others may show wide variation. 350 men are employed and the cost of candles is \$3 per man per month, working 30 days.

It would thus at first appear that electricity would be the ideal method of lighting a mine. It has proved satisfactory in many cases, but it has drawbacks. The lights cannot quickly and readily be moved from place to place and withdrawn when a blast is to be fired. The sharp rocks cut the covering and sulphur in the water and powder fumes rapidly destroy the insulation. Conditions of operating vary so greatly that it is difficult to obtain figures which would be even approximately accurate for the cost of electricity per lamp in mining plants, but the general opinion seems to be that a :6 c p. electric light costs from S cents to 10 cents per S hours.

The ideal light must be bright and clear, free from smoke or smell, easily transported and one which is inexpensive in first cost and cost of operation. It must above all be capable of use by inexperienced men and those found on the ground. It must be safe, durable and economical.

Acetylene gives a light the brilliance of which is beyond question and on analysis the light is found to be the nearest approach to sunlight of any artificial light yet produced. With regard to its effect on the purity of air in confined spaces, we quote from a recognized authority, Prof. Vivian E. Lewes: "The researches of Dr. Grehánt "have shown us that when burning with a smokeless flame, no carbon "mon-oxide can be detected in the products emitted by the com-"bustion of acetylene, and its sanitary position will, therefore, be "defined by the amount of oxygen abstracted from the air and carbon "dioxide produced, as compared with other illuminants. Taking the "average sized room which would be well lighted by an illumination "equal to 64 standard candles, we find that this amount of light from "the various illuminants would show the following results:—

	Oxygen removed from air, cubic foot,	Products of water vapour,	Combustion carbon dioxide.
" Sperm candles	38.5	26.2	43.6
" Paraffin oil	24.9	1.1.0	39.8
" London gas-Bitswing burner	26.1	27 1	19.2
" " Argand "	23.0	25.6	17.0
" " Regenerative burner	10.6	S.3	5.2
" " Incandescent "	3. I	4.Ğ	ī.S
" Acetylene	š.o	2.0	4.0 "

The incandescent electric light of course is not mentioned as it is ideal in this respect, but we see that with the exception of the incandescent mantle gas burner, nothing approaches acetylene. It might also be said in justice to the objects of this paper that the paraffin oil mentioned in the table was not burned in smoky miners' lamps where obviously its bad effects would be largely magnified.

Attempts have been made to perfect an acetylene lamp which would endure the severe service imposed by conditions found even in the best tunnels and mines The Baldwin Acetylene Mine Lamp, illustrated herewith, has been in use for the last year and during this tume under close investigation, the results have been uniformly satisfactory. These lamps are now offered in Canada by The James Cooper Manufacturing Co., Ltd., of Montreal.



This lamp is made in two styles—the smaller, known as the "Superintendent's Lamp" is intended for superintendents, surveyors, mine bosses, inspectors and others moving about from place to place. It is useful for surveying purposes, as the flame when looked at end on, is only about 's inch in diameter and there is a metal point on the lamp, just under the centre of the flame, which permits of its being set very accurately over a surveying point. It weighs 9 oz. and will hold a charge of carbide sufficient to keep it burning at full brilliancy for four hours. It takes only a couple of minutes to clear out and recharge the lamp with carbide and fill the tank with water

The larger form, or "Gang Lamp," is intended for headings, enlargements, stations and switching points where a large volume of light is required to permit several men to work. The No. S lamp, burning  $\frac{1}{2}$  ft. per hour, gives about 20 candle power. The No. 7, burning  $\frac{1}{2}$  ft. per hour, gives slightly more than half this amount of light, or about as much as 6 sperm candles, or three oil lamps. The actual illuminating effect is far greater since it gives off absolutely no smoke to deaden the light.

These lamps are solidly made of cast iron to stand severe usage and one may be turned upside down or colled about on its side without fear of the light going out or in any way affecting its burning qualities.

Relative to the cost of operating, it has been found that 1 lb. of calcium carbide will easily give 4 cubic feet (often more) of gas. Carbide will cost in quantities about 6 cents per pound at the mine. No. 7 lamp holds  $\frac{1}{2}$  lb. of carbide and has a burner consuming  $\frac{1}{2}$