

THE DEVELOPMENT OF MINE LIGHTS

Electric Lights

Electric lamps were placed on the market in 1902, but, on account of the objections common to all the earlier types, they were not favorably received.

In 1909 the Tungsten miniature lamps were first placed on the market in America for limited or special commercial uses. The efficiency or watts per candle, was about three to four times better than the carbon lamp.

In March, 1911, Thomas Edison became interested in the development of a practical miner's lamp and in May, 1912, the first lamps made by the Edison Storage Battery Company appeared, and concurrently the Wico lamp was introduced.

During the latter part of 1913 the Bureau of Mines, through H. H. Clark, became interested in the electric cap lamp, and after a personal tour of inspection and investigation took up the work with a view of standardizing its various features. Their chief concern was safety, thus making the lamp acceptable for general mine use. All available makes were studied and tested, and as a result a schedule of official tests was prepared, which was used in establishing a list of permissible safety lamps for use in mining. This step was the means of bringing home to the manufacturer the realization that the electric cap lamp was here to stay and created not a little competition to produce the best lamp possible.

Today we find the cap lamp comprising a non-spillable battery mechanically protected by an aluminum or steel case having the cover locked and arranged to be carried on a belt, a special twin flexible conductor conveying the current from the battery to the lamp on the cap, encased for a short distance at both ends by flexible steel armor, serving as an anchor and preventing sharp bending. The lamp consists of a parabolic reflector equipped with safety features, in which is mounted a tungsten lamp, the opening supporting a glass lens cushioned on gaskets held in place by a cap or spring, and provided with a hook to fit into the miner's cap.

When wearing the outfit a man can put himself in any position without restraint. It does not interfere with free motion of the body in any direction. He can use all tools and perform any desired work with as much freedom as when wearing the oil cap lamp.

Special combination charging stations are provided with facilities for charging, cleaning and filling both the electric lamps and the oil safety lamps.

The electric cap lamp has fully passed the development stage though improvements will doubtless continue, thus bringing it to a higher degree of perfection as the requirements are better understood and appreciated by the users.*

The electric hand lamp differs from the cap lamp only in detail. The battery and bulb are

brought together into one unit and thus the cord is eliminated. As with the oil safety lamp it is carried by means of a bale and when at the working face can be hung on a post conveniently close to the workings. While the weight of the hand lamp is frequently cited as an objection it must be borne in mind that this weight is not continually carried as the case with the cap lamp.

The Acetylene Lamp

Acetylene gas was accidentally discovered in 1836 by Professor E. Davy, of Dublin; but not until 1892 was it produced at a commercially cheap rate. It was likewise accidentally discovered by H. Moissay, who, while conducting experiments with an electric furnace, noticed that the wall of the furnace, consisting of lime, fused into a liquid state at 3,000 degrees, Centigrade, and that a combination between it and the carbon of an electrode produced calcium carbide. T. L. Wilson, by accident also, while experimenting with an electric furnace, discovered a method which resulted in the manufacture of calcium carbide on a large scale.

Carbide lamps are too well known to require description. The following advantages over oil or candle light are claimed for them:

1. Produce no carbon monoxide.
2. Produce 1/10 the amount of carbon dioxide, and 1/13 the amount of water vapor that an equal light of candles would produce.
3. Consume only 1/5 as much oxygen.
4. Give a 4 to 6-candlepower light.
5. Cost less, being about eight cents for a 10-hour shift.

Their use has extended into nearly all the States. Some of the early objections to the use of carbide lamps are as here stated, but improvements made and a better understanding of the lamps have done much to weaken these.

First—The offensive odors from unconsumed carbide when the bottom is emptied in the mine.

Second—Gas escaping at the screw top.

Third—The scattering of fresh carbide on the damp floor, with the danger that the fumes from it may be ignited and cause injury to life and property.

Fourth—The possibility of fumes being given in the burning that are injurious to the sight and health.

Carbide Safety Lamp

In intelligent hands this lamp can be used successfully and an excellent light is afforded, which amply compensates the disadvantages

*For a very interesting account of the development of the electric cap lamp in America, see paper by J. T. Jennings, "Historical Development of the Miners' Electric Safety Cap Lamp," Proceedings Coal Mining Institute of America, 1916, and which has been drawn upon in this article.

MINE SAFETY APPLIANCES CO.

Chamber of Commerce Building
PITTSBURGH, PA.



CHICAGO
CLEVELAND
SAN FRANCISCO

DENVER
HUNTINGTON, W. VA.
ST. LOUIS

LOS ANGELES
NEW YORK
SEATTLE



PHILADELPHIA
PITTSBURG, KANS.
WILKES-BARRE, PA.
(Kingston)

Branch Offices

Everything for Mine and Industrial Safety

The New Edison Model E Electric Safety Mine Lamp

Approved by the U. S. Bureau of Mines.
Over 200,000 Edisons installed throughout the United States, Canada and Mexico.
Installations everywhere have proved the Safety, Efficiency and Durability of these lamps.

Special Features

Provides a clean light of nearly six candle power.

Burns 12 hours continually or intermittently without any attention.

Remains indefinitely in charged or discharged condition without deterioration.

Costs less for upkeep and gives more light throughout the average shift than open lights.

Three times as much light as Model "C" (Approved No. 10) Edison Lamp, 50% more illumination than any other approved cap lamp.



The New Edison Lamp In Use

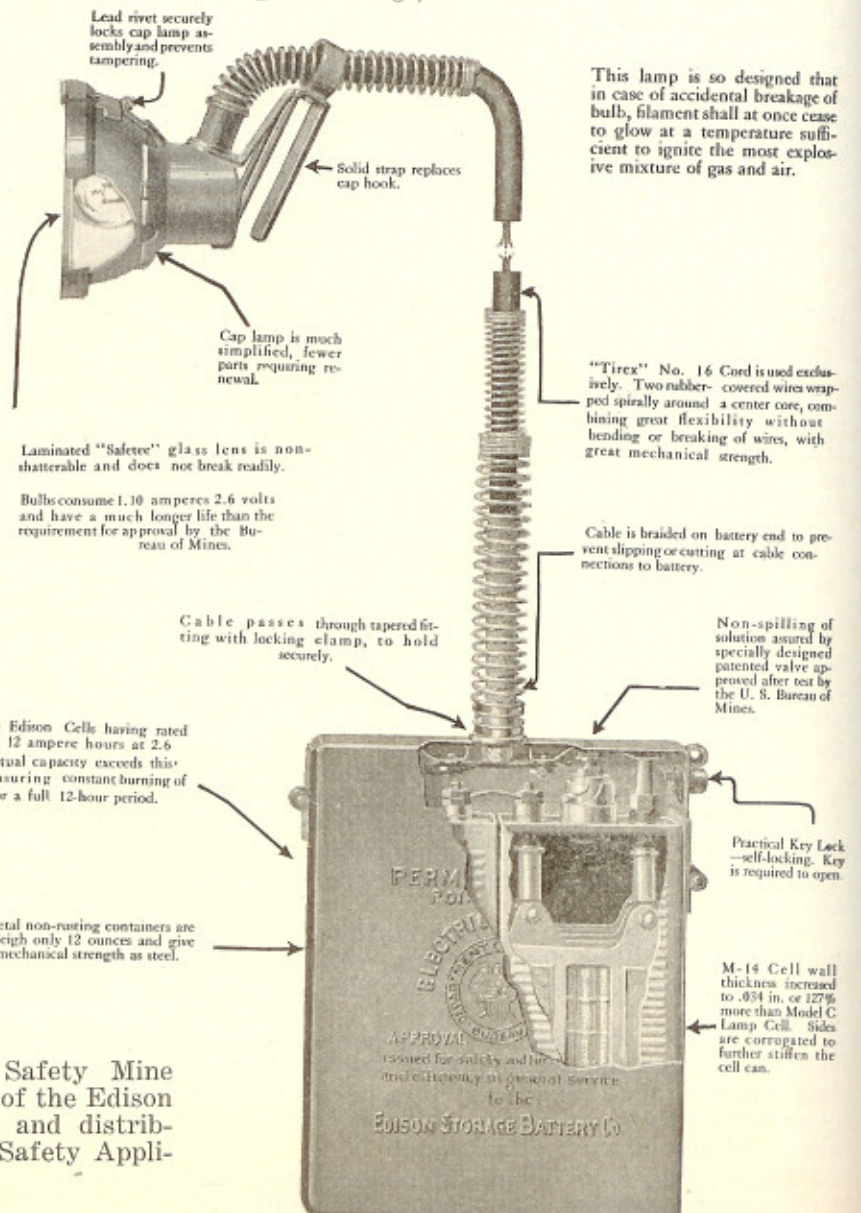
All Models of Edison Electric Safety Mine Lamps are manufactured at the plant of the Edison Storage Battery Co., Orange, N. J., and distributed in North America by the Mine Safety Appliances Co.

Specifications

Type of Battery.....M-14
Number of Cells..... 2
Rated Capacity,
Ampere hours.....12
Hours Illumination
after full charge.....12
Normal Charging Rate
Amperes2 1/4
Length of Charge, hrs.. 8

Weights:

2 Cells Assembled, ozs. 52
Monel Container, ozs. 12
Headpiece, ozs.20
Total ozs.84
Capacity BM-18 Bulb,
1.10 Amps.



GEM MANUFACTURING COMPANY

Successors to
THE GRIER BROTHERS COMPANY

1229-1243 Goebel St., PITTSBURGH, PA.

Manufacturers of

Grier J. & T. Carbide Lamps

The Lamp You Have Waited For

Products

Carbide Lamps for Miners; Carbide Flasks—
Tips and other repair parts; Miners' Dinner Pails,
Powder Cans and other miners' equipment.

J. & T. Tip Cleaner

The J. & T. Tip cleaner with which Grier Lamps are now equipped is a recent invention, and thoroughly covered by patents. The cleaner is always with the lamp ready for instant use. The tip can be cleaned as often as necessary without extinguishing the light. It will save the miner both time and money. The cost added to the price of the lamp is very little compared to the advantages to be derived.

Construction—The device is so simple that there is nothing to get out of order from corrosion or otherwise.

A small wire of special composition works inside of the lamp, being housed in a brass tube and attached to a push button. A slight pressure on the button on outside of lamp injects the wire

into the gas orifice in the burner and forces out any dirt or other matter lodged in the burner.

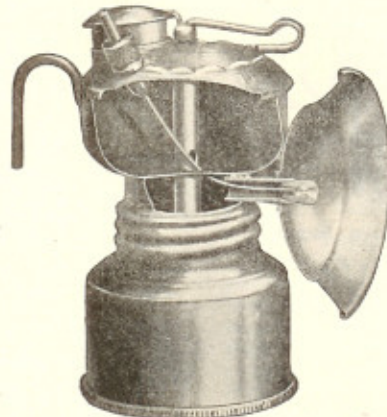
The diameter of the cleaning wire is slightly less than the diameter of the gas opening in the burner, so that when the wire is projected into the opening the light will not be extinguished.

It is not necessary to remove the lamp from the cap.

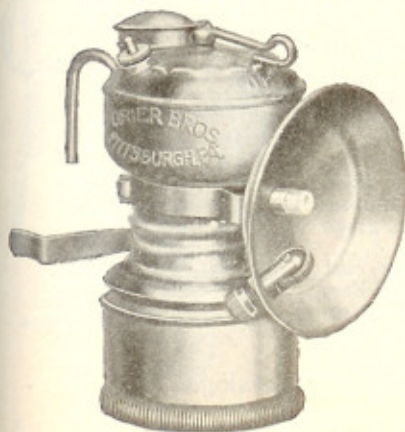
All lamps tested before leaving our factory. Lamp equipped with Grier "Loc-on" reflectors and brass, lava insulated tips. All parts are easily replaced. Lamps made with 2¼", 2½" and 3" reflectors. Not a better made lamp on the market.

Recent improvements made in our lamps—lower push button on tip cleaner; heavier cleaning wire, will not bend or break; stronger carbide bottoms; improved new felt holder; general construction throughout improved to make our lamps stronger and better than ever before. Lamps furnished with round or flat hooks.

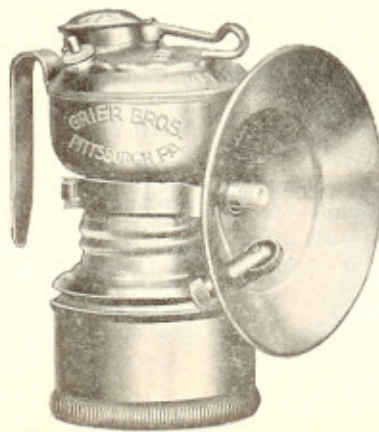
Write For Catalog.



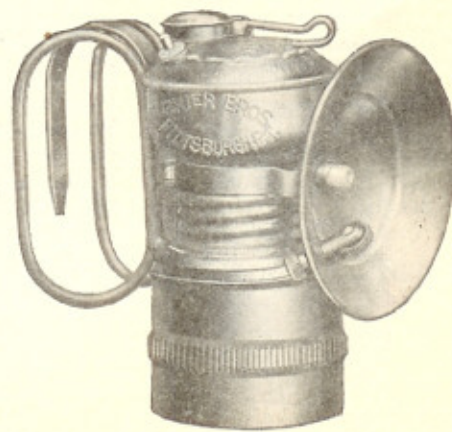
Cut Showing How J. & T. Cleaners
Are Installed in Grier Lamps



Round Hook Coal Miners' Lamp



Flat Hook Metal Miners' Lamp



Inspector's Lamp—Large Carbide Bottom

JUSTRITE MANUFACTURING CO.

2061-2081 Southport Ave., CHICAGO, U.S.A.



Manufacturers of
Carbide Miner's Lamps

For All Mining Purposes

Products

Miner's Lamps—all types—in brass, steel and aluminum.

Miner's Caps—Carbide Flasks—Burner Tips—and all necessary supply parts.

Sanitary Pails, Safety and Oily Waste Cans.

The models illustrated on this page are the most desirable for metal miners, and are known as "Metal Mine Lamps."

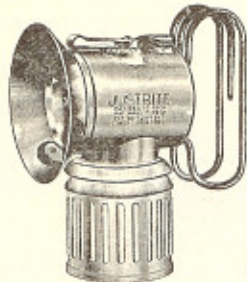
All lamps except "Little Giant" and "Uncle Sam" are equipped with self-lighter attachment. "Justrite" Lamps are constructed on scientific principles—only the very best material and workmanship being used. Every lamp is guaranteed.

If interested in other models, consult our general catalog.

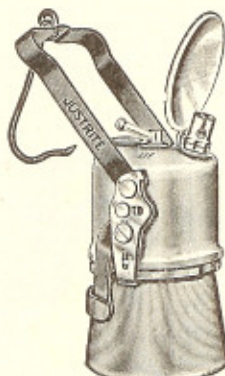
LARGE TYPE LAMPS



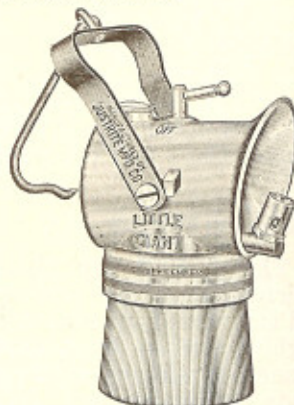
Cap Lamp
No. 407—Wire Feed
No. 707—Polygon Feed
Burns 2½ hrs.
Brass or Nickel



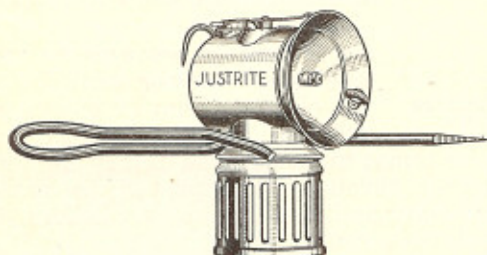
Superintendent's Lamp
No. 95—Burns 4 hrs.
Brass Nickelplated



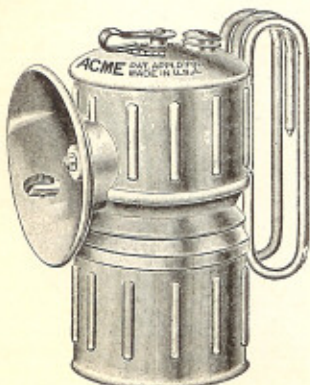
"Uncle Sam"
No. 306—Burns 6 hrs.
Aluminum



"Little Giant"
No. 110—Burns 6 hrs.
Aluminum



Candle Stick Lamp
No. 103—Brass. Burns 4 Hours.



No. 56—With Folding Handle Steel.
No. 80—Nickelplated—For Superintendents.

SPECIFICATIONS
Burning Capacity—5 to 6 hrs.
Candle Power—18 C. P.
Weight—15¼ ounces.
Charge (¼" Carbide) 5 ozs.
Height of Lamp—5½ inches.
Height to top of bail—7¾ in.
Diameter Bottom—2¾ inches.
Diameter Reflector—3 inches.



No. 171—Flame Protector

The New "Acme" Steel Lamps
Rustproof Finish—Half Shift Size
Wind and Water-proof

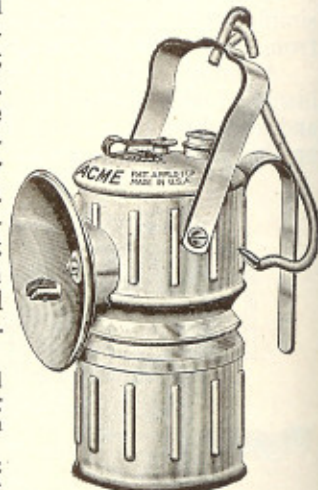
"A Strong and Rugged Steel Lamp."

The "Acme" Lamp is so constructed that it will give the miner a dependable and efficient light at the most economical cost.

Note particularly the reflector, which fits snugly into the reflector brace, and is held in a permanent and rigid position by the knurled nut—not easily bent, broken or lost. Also equipped with No. 171 Flame Protector.

This lamp has been tried by many of the large mining companies, and has given most excellent service.

Consistent with the cost of this lamp, it is the best value of any steel lamp on the market.



No. 50—With Ball and Hook Steel

Write For Catalog.

World's Largest Manufacturers of Carbide Miner's Lamps.

SHANKLIN MANUFACTURING CO.

2725-27-29 S. Eleventh St., SPRINGFIELD, ILL.

Miners' Carbide Lamps and Supplies

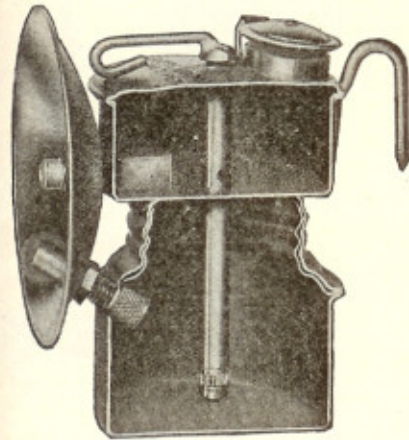
Products

Miners' Carbide Lamps; Carbide Lamp Supplies.

Shanklin's Carbide Lamps

These lamps are made in a wide variety of styles, as described below.

The outstanding feature of all lamps is the Guy Patented Water Dropper, which was perfected several years ago by Mr. Frank Guy, a practical miner, and we have used it for ten years in our lamps, during which time it has proved to be a most accurate and thorough device for feeding water to our Carbide Lamps.



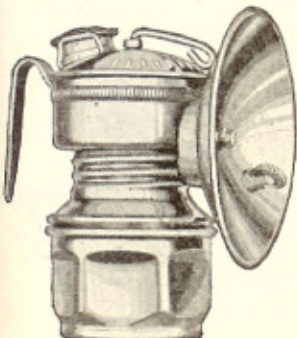
Guy's Patented Water Dropper

A feature of the Guy Water Dropper is the Valve Cleaner, which is a knurled thimble put on the dropper between the button and the end of the dropper tube. If dirty water is used and the dropper becomes clogged, a few turns of the valve cleaner with the fingers will open it up.

No. 22 Lamp

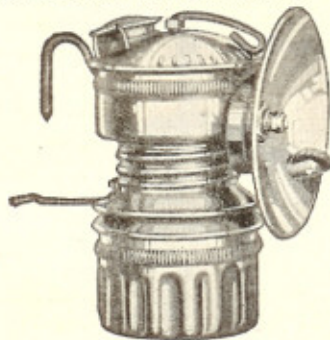
Has 2 3/4" polished reflector, fastened to lamp with lock-nut screwed on burner tube. Reflector is strongly reinforced on back to protect it from accidents. Intended for use in rooms or entries with high roofs.

Brass lamp only, retail price \$1.00.



No. 22. Corrugated or Hex. Bottom; Flat Hook or Round Hook and Brace.

Throws a bright spot of light 50 feet.



No. 220 Lamp, same as No. 22, but nickel plated. Retail price \$1.25.

No. 23 Lamp

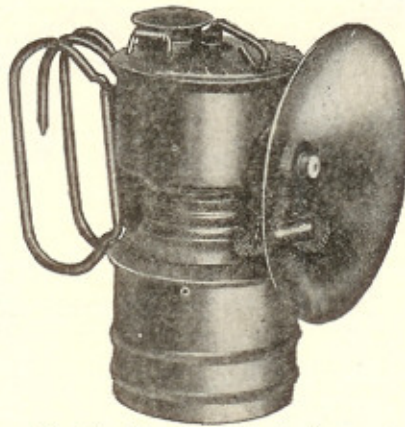
Has large, deep, highly polished 3-inch reflector, fastened to lamp by lock-nut screwed to burner tube. Reflector strongly reinforced on back to protect it from injury.

Intended for inspectors and workmen needing an extra large light.

Brass Lamp only. Retail price \$1.15.

No. 23 Lamp Plain, same as No. 23, except without lighter. Retail price \$1.00.

No. 230 Lamp is same as No. 23, but nickel-plated. Retail price \$1.40.



No. 10. Superintendent's Lamp.

No. 10 Lamps

Superintendent's hand lamp. Can be furnished with any of our reflectors, but is usually equipped with the No. 23 reflector.

Has 50 per cent. more capacity than our regular lamp and will burn 4 hours. Has large hook and large folding handles.

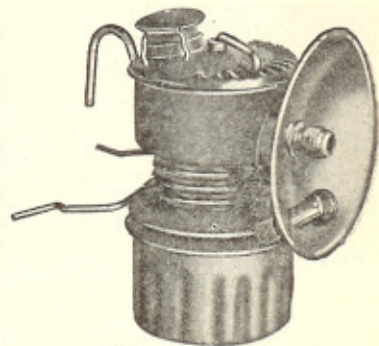
Can be worn on the cap.

Brass lamp only; retail price \$1.50.

No. 100 Lamp. Same as No. 10, but nickel-plated. Retail price \$1.75.

No. 225 Lamp

Has 2 3/4 inch nickel plated reflector with self lighter. Equipped with our new metal, Non-blow-out tip. Wire brace and corrugated bottom only. Especially intended for drivers, motormen and shotfirers who need a light that will withstand a strong draught of wind or concussion of a shot. Retail price \$1.10.



No. 225 Lamp.

No. 4 Candlestick

Slips on over bottom of lamp. Much stronger and better than a stick that clamps around the screw cap. Does away with the screw cap spreading and making a gas leak around the rubber gasket. Fits our cap lamps and four-hour lamps.



Candlestick

Retail price 30 cents each.

No. 6 Candlestick

Same as No. 4, but made to fit our half-shift lamps. Retail price 35 cents each.

Supply Kit

Contains an assortment of lamp supplies most frequently called for by the miner; also, the repair parts most likely to become lost or worn out, and which require replacement.

Conveniently arranged in a strong, durable cardboard box with hinged cover.

No. 1—\$8.00; No. 2—\$4.50.



Supply Kit

Wolf Safety Lamp Company of America, Inc.

220-224 Taaffe Place, BROOKLYN, N. Y.

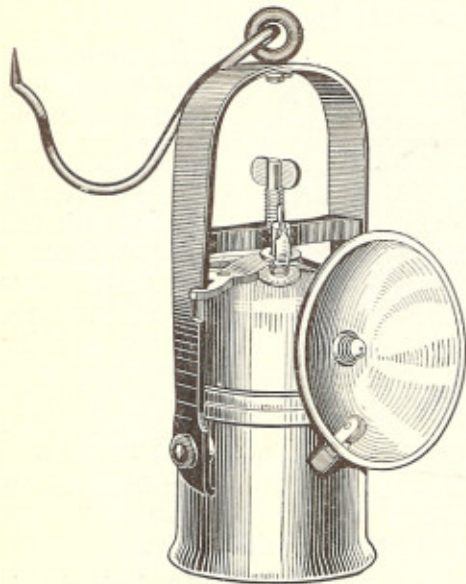
Miners' Carbide Lamps

Products Made in U. S. A.

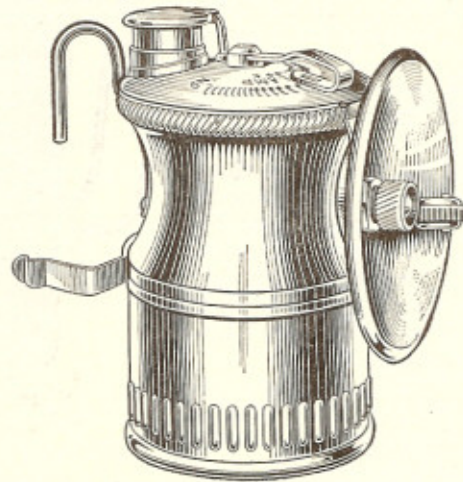
Miner's Carbide Lamps for hand, cap, trip and general utility purposes. Miner's Safety Lamps burning naphtha, vegetable oil and car-



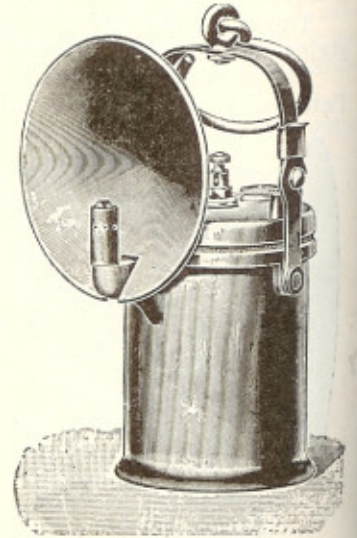
bide. Tools and Accessories for all types of lamps. Newton Oiling Device for mine car wheels.



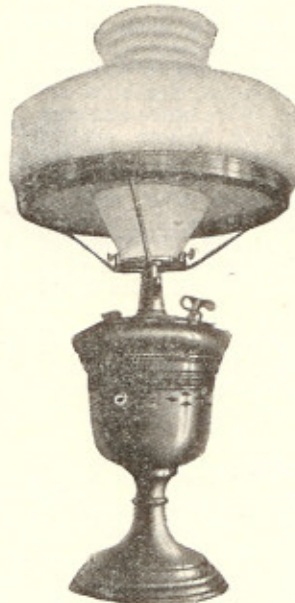
No. 905a. Hand Lamp.



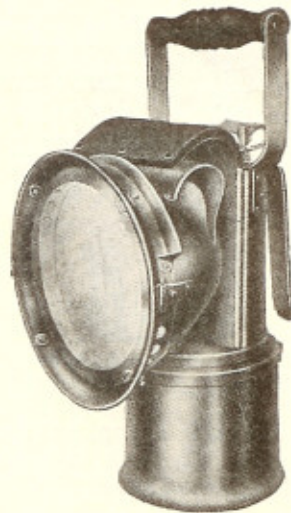
No. 911c. Cap Lamp.



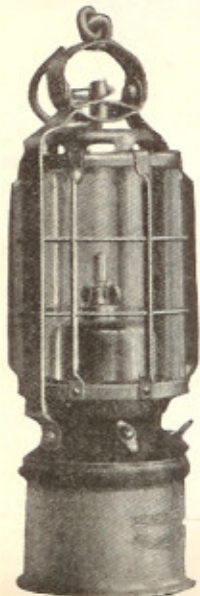
No. 856. Hand Lamp.



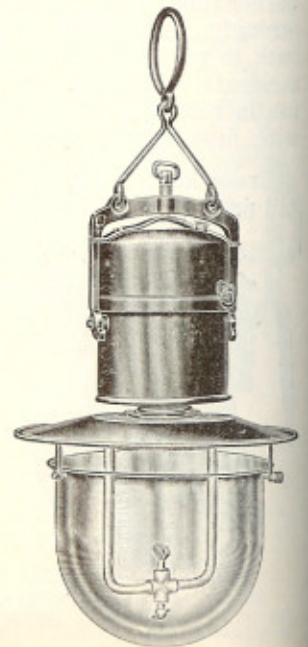
No. 91. Table Lamp.



No. 871. Hand Lamp.
(Also used as Trip Light).



No. 752c. Lantern.



No. 750a. Hanging Lamp.

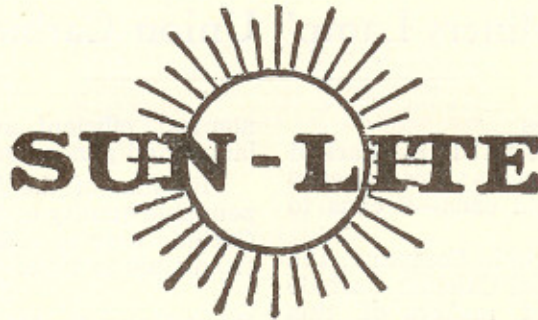
Our Line of Lamps is undoubtedly the most complete on the market. All WOLF Lamps are guaranteed to give satisfaction or we will return your money without any question. Lamps are made in all metals and different sizes. They are either made out of steel heavily tinned or out of brass highly polished or nickel plated.

Full Description in Our General Catalogue, Copy of Which Will Be Mailed to You at Once Upon Receipt of Postal.

GAS TANK RECHARGING COMPANY

(INCORPORATED)

Calcium Carbide Plant
KEOKUK, IOWA



General Office
MILWAUKEE, WIS.

Calcium Carbide For Miners' Lamps

A selected size Calcium Carbide for Miners' Acetylene Lamps.

Regular and uniform pieces, free from dust and fines.

Yields an abundance of pure, clean acetylene.

Packed in 100 lbs. and 25 lbs. non-returnable steel drums.

Also furnished in cases of

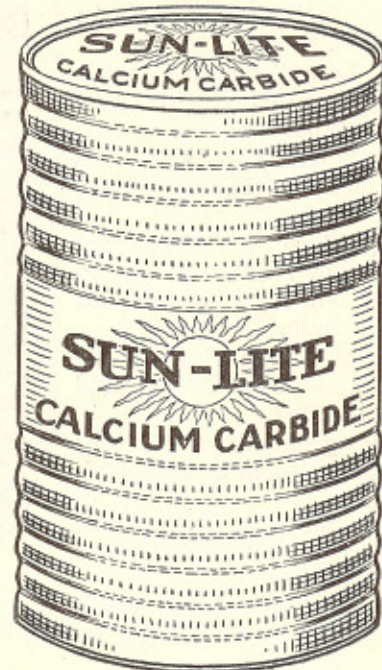
6—10 lb. cans

and

24— 2 lb. cans

Other sizes for Industrial Plants, House Lighting, Contractors Portable Torches and Flare Lights.

Write for carload prices for shipment direct from factory or for location of nearest wholesale dealer.



Large stocks of "Sun-Lite" Carbide are carried in principal Mining Fields and Industrial Centers.

Address all correspondence to Milwaukee, Wisconsin.

UNION CARBIDE SALES COMPANY

NEW YORK
Carbide and Carbon Bldg.
30 East 42nd St.

CHICAGO
Peoples Gas Bldg.

SAN FRANCISCO
Balfour Bldg.

We Have Union Carbide Warehouses in 175 Cities

"Miners Lamp" Union Carbide

Union Carbide For Mine Lamps

"MINERS' LAMP" UNION CARBIDE—Packed in 100-pound drums; 25-pound drums; 2-pound cans—24 cans to the case; 10-pound cans—6 cans to the case.

Manufactured by Union Carbide Company, the Original Producers of Commercial Calcium Carbide and today the world's largest makers of this product.

"MINERS' LAMP" is a size of UNION CARBIDE specially adapted for use in Miners' Carbide Lamps.

Because of its special selection, uniform high gas yield, special sizing and screening, and freedom from dust, "Miners' Lamp" Union Carbide is the most economical and satisfactory Carbide for use in Miners' Lamps.

"Miners' Lamp" Union Carbide will keep indefinitely if protected from air and moisture.

UNION CARBIDE—WORLD'S BEST QUALITY—HIGHEST GAS YIELD.

Union Carbide has for more than twenty-five years been recognized as the World's Standard for Quality in Carbide.

The use of Union Carbide results in greatest satisfaction and lowest cost, because:

It has the greatest gas content and is always uniform and dependable in quality.

Union Carbide is always the same—always highest grade and most carefully selected.

When using highest gas yielding Carbide, lamps and other apparatus require recharging less frequently.

Considerable time and labor is saved by the smaller number of chargings. The time saved can be applied to other duties.

The wear and tear on the lamps, or other apparatus, is lessened by reducing the number of rechargings.

There is a smaller quantity of residue to handle per unit of gas consumed, when highest gas yielding Carbide is used—another worth-while saving in time and labor.

When Carbide having the highest gas value is used, a saving is effected in the cost of transportation and handling charges in proportion to the amount of gas actually generated.

The correct uniform sizing and careful screening of UNION CARBIDE assists greatly in the eco-

nomical, efficient and uninterrupted operation of lamps and generators.

Because of the faithfully sustained, always dependable quality of Union Carbide, it is easy for the Carbide user to estimate his Carbide requirements from time to time.

What Union Carbide Is Used For

In addition to being used by more than a million miners in cap lamps, hand lamps and other portable and stationary mine lighting equipment, Union Carbide, crushed to the several regular commercial sizes, is extensively used for the following purposes: The lighting of country buildings of all types and sizes; cooking; the oxy-acetylene process for welding and cutting all metals; contractors' torches and flare lights; lighthouses and buoys; train, locomotive, railroad signal and station lighting; motor vehicle lighting; life saving equipment; fire departments; physicians' lamps; scientific and laboratory purposes; searchlights; moving pictures; stereopticons; hunting and trapping; fishing, camping and boat lighting; gathering cotton and small fruits at night; night operation of tractors and other farm implements; steam boiler and other inspection work; and scores of other uses.

Our Blue and Gray Package

Union Carbide is always packed in distinctive Blue and Gray containers. The excellence of our package is in keeping with our aim

to diligently protect the interests of users of our product in the matter of Carbide quality from the time it is packed at the Works until it is consumed by the user.

Union Carbide will keep for years in the original package without deterioration.

The Blue and Gray package is, therefore, a symbol denoting: best grade Carbide; highest gas value; uniform dependable quality, and purest gas.

Our Nation-wide Distributing System

For the convenience and economy of Carbide users we carry large stocks of Union Carbide in our own warehouses, at 175 convenient shipping points throughout the country.

Shipments are made the same day that orders are received.

Directory of Union Carbide Sales Company's Warehouses Appears on Opposite Page

