THE ARNOLD CARBIDE CANDLE - AN UPDATE

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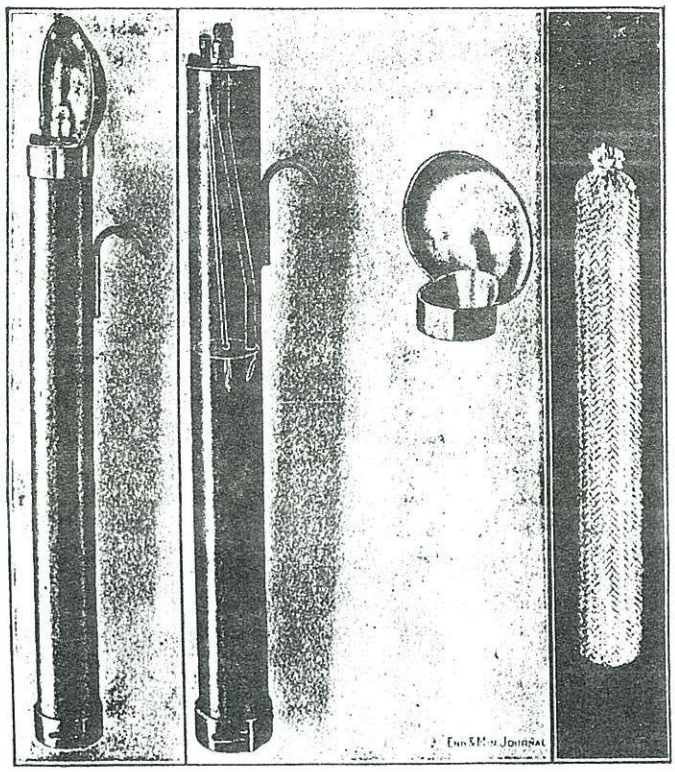
There has been some new information found concerning the Arnold Carbide Candle since the article in the Spring 1989 issue of the *MAC* first appeared. One of the main sources of information is from the patent specifications which gives an insight into the original design of the Arnold Carbide Candle invented by Ralph R. Arnold.

Ralph Arnold--a mining engineer from Cripple Creek, Colorado--filed for a patent for "new and useful Improvements in Acetylene-Candles" on August 7, 1911, and was granted a patent for his lamp on October 29, 1912.

The main basis for this type of carbide lamp was his assertion that with "the use of ordinary acetylene lamps, it is known that their unhandy shape and size render them impractical for the use of the miner, who will discard them for the ordinary tallow candle which he may use in his miners' candle stick." Arnold claimed that acetylene light was superior, and therefore preferable, to the ordinary candle as long as it was economical, easily refiled, and more importantly, "readily adjustable to the miners' demands." Arnold planned to overcome those objectional features "by providing a gas generator of approximately the size and shape of the ordinary candle and adapted to be used in the standard miners' candle stick."

This aspect of the original intention of the Arnold Carbide Candle has been overlooked because of the actual size of the lamps. Further information about the original intent of the Arnold Carbide Candle can be found further on in the patent in the description of item #19 on the patent drawings. The patent description of this item is as follows: "A preferably metal encircling band 19 is rigidly attached to the exterior periphery of the tube 1 at a point intermediate of its ends and effectively controls the position of my improved carbid candle in the standard miners' candle stick in which it is designed to be used."



The Arnold Carbide Candle

Figure 1. A picture of the Arnold Carbide Candle showing the added reflector and a filled, cloth carbide bag from a January 18, 1913 issue of *The Engineering & Mining Journal.*

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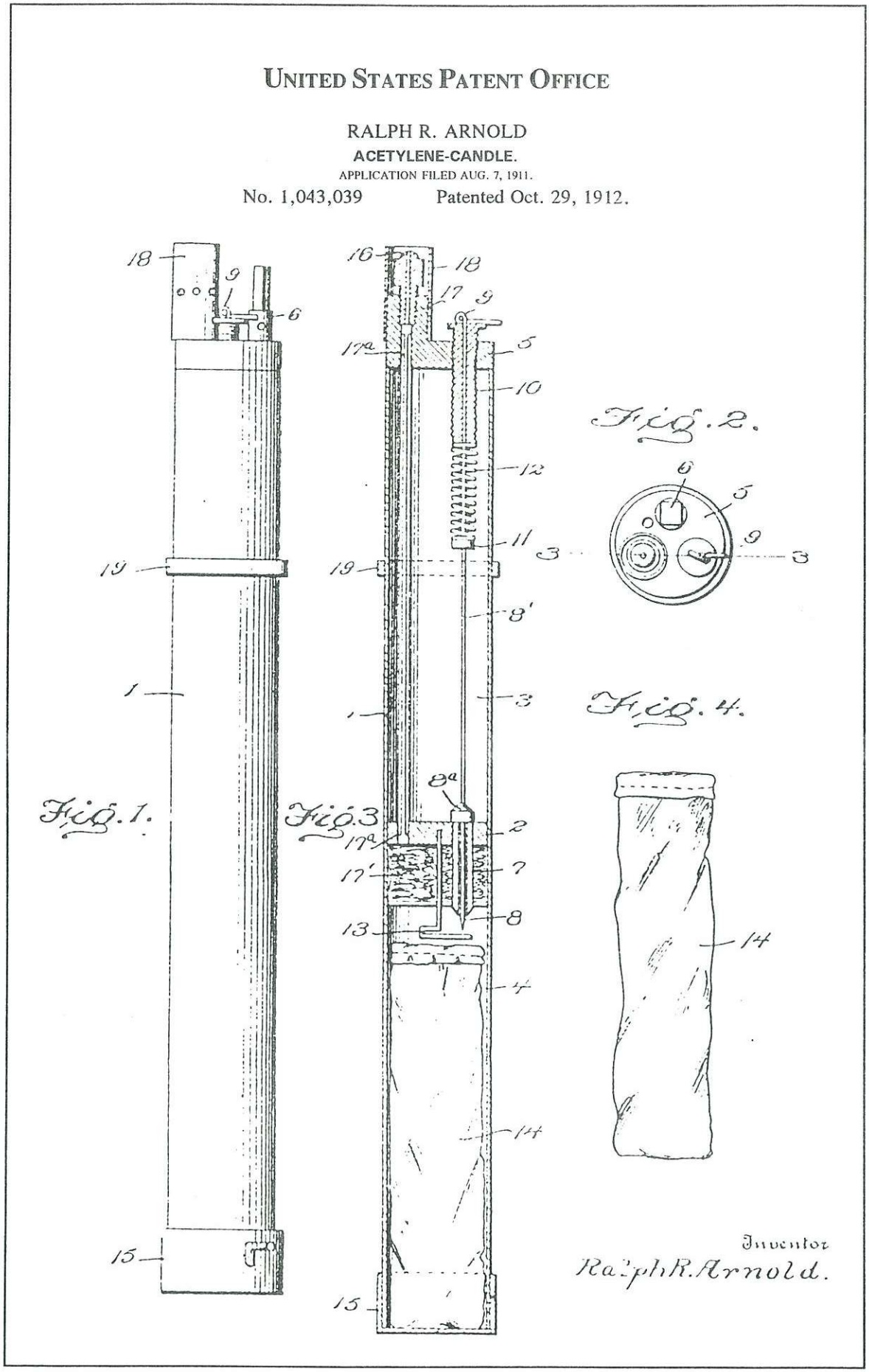

Figure 2. The patent drawings for Ralph R. Arnold's 1912 patent drawing for Improvements in Acetylene-Candles. Item 14 is the cloth carbide cartridge bag and 19 is the retaining band that was to control the position of the carbide candle in the standard miners' candle stick in which it was originally

In order for the Arnold Carbide Candle to have been used in a standard miners' candlestick, the lamp would have had to have been $^3/_4$ of an inch in diameter--the same diameter as an ordinary mining candle. A lamp of this small of a diameter would have probably had a capacity that was insufficient to generate the desired amount of acetylene gas for a prolonged period of time. This is probably why all of the known manufactured Arnold Carbide Candles are $1\ ^1/_4$ inches in diameter and 12 inches long. The increased diameter--even though only half an inch--would increased the gas production considerably.

Most of the other features concerning the Arnold Carbide Candle have also been changed slightly as compared to the patent, but this is to be expected as a prototype lamp becomes a manufactured lamp. The basic concept of the Arnold Carbide Candle has remained the same, especially concerning the carbide cartridge (item 14 on the patent drawings).

The reason for this carbide cartridge was fourfold. 1) "The quick replacing of the carbid and insures the economical operation of the lamp. 2) "The water has free access to the carbid from all sides and the cartridge is of such shape that the oxidized carbid cannot form in a cake about its unused portion." 3) The carbide cartridge "make it impossible for the ashes to enter and clog the water tube or to enter the gas feed tube." And 4), The cloth exterior of the cartridge "retains the waste material until the same is manually removed."

Up until recently, all of the Arnold Carbide Candles known have come with this cloth carbide cartridge bag. The lamps were sold with an extra bag and a tin container with lid, 1 inch in diameter by $6\ ^7/_8$ inches long, to hold the extra full carbide cartridge.

Just recently, an Arnold Carbide Candle of basically the same design was acquired by Chuck Tesch of Lead, South Dakota. As shown in Figure 3, this lamp is identical to all of the other Arnold Carbide Candles except that instead of having the cloth carbide cartridge, this lamp has a metal cylinder--open at the top--that slides up into the bottom of the lamp. This cylinder was probably designed to replace the cloth cartridge because the cloth cartridges probably tended to get soggy and fall apart after a number of uses. It was probably also very difficult to clean the used carbide out of the bags--especially after the used carbide had a chance to dry out and get hard.

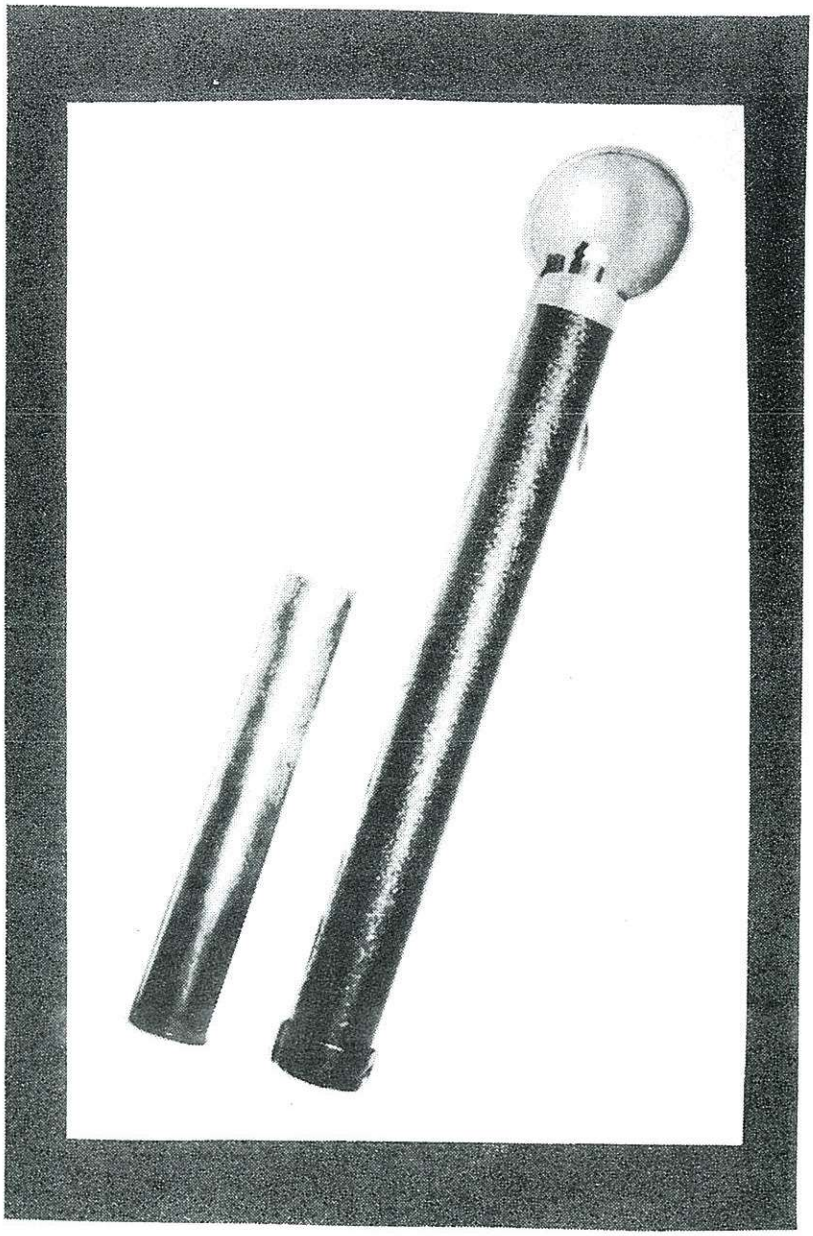

Figure 3. A photograph of the Arnold Carbide Candle showing the metal cylinder--open at the top--that slides up into the bottom of the lamp. (Chuck Tesch collection)

The other distinctive feature about this lamp is that, unlike all of the other Arnold Carbide Candles known--which are brass and originally came with gilt paint--this lamp has a crinkled black paint finish.

Probably soon after Ralph Arnold received his patent, he contracted with William Ainsworth & Sons to manufacture his lamps. It was probably during this time that modifications in the lamp's design were made.

According to advertisements, the Arnold Carbide Candle had a two year tryout underground in the Cripple Creek mining district.

It also appears that originally, the Arnold Carbide Candle was designed without a reflector as no reflector is shown in the patent drawings or mentioned in the patent text. The reflector was probably added when Wm Ainsworth & Sons began manufacturing the lamps.

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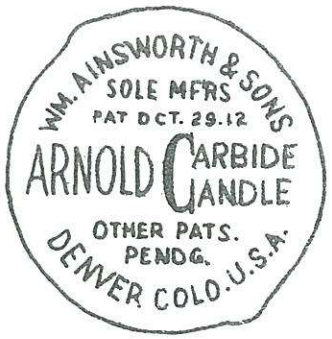
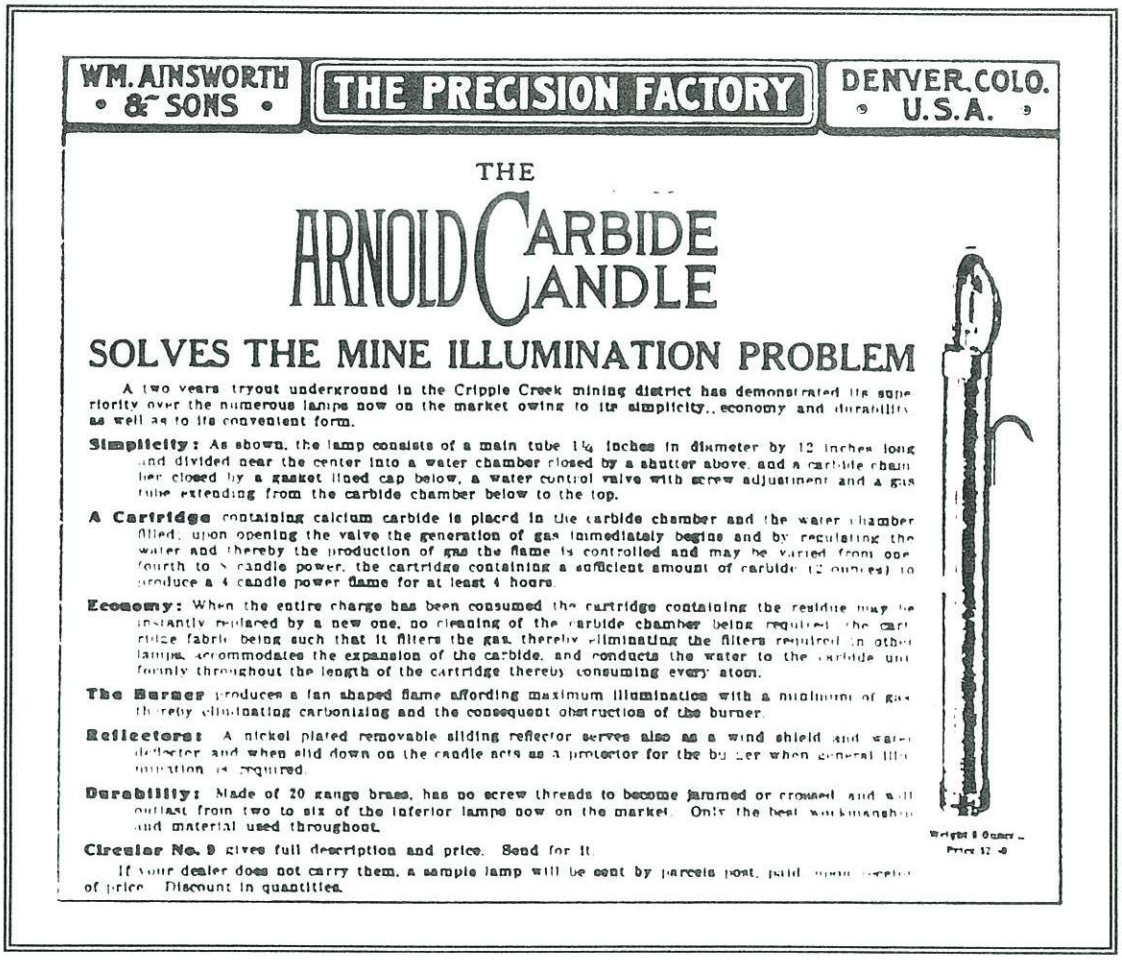


Figure 4. The incused stamping that is located on the bottom of the cap closing the carbide chamber.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Economy: When the entire charge has been consumed the cartridge containing the residue may be instantly replaced by a new one, no cleaning of the carbide chamber being required, the cartridge fabric being such that it filters the gas, thereby eliminating the filters required in other lamps, accommodates the expansion of the carbide, and conducts the water to the carbide uniformly throughout the length of the cartridge thereby consuming every atom.

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Figure 5. An advertisement describing the attributes of the Arnold Carbide Candle.