

# Baltimore Glass Manufacturing Company, 1896-1903

On July 5, 1894, Seraphin Kribs made application for a patent for a press for making screw insulators. (Figure 1.) Seraphin Kribs was a citizen of Germany but he lived in Brooklyn, New York, and worked as a machinist for the Brookfield Glass Company. He developed his idea while working for William Brookfield, who was the subsequent assignee of the patent when it was issued on July 9, 1895.

The period of development which preceded the actual patent application naturally involved other employees of the Brookfield Glass Company. There were corrupt and dishonest forces at work in some of these people, and that is our story. Jacob Pease (plant superintendent), Charles J. Jordan (assistant superintendent), Mr. Flohl (draftsman), and Anthony Kribs, who was Seraphin's brother, are the principals involved. Court records tell us that "when Kribs constructed the first machine that was to become known as the 'Kribs Press', Jordan declared that it would not work and himself admits that he did not appreciate its value at the start." It is also significant that at the insistence of Pease, Jordan decided to claim the invention for his own and got Flohl, a draftsman at the factory, to make drawings for him secretly. Together they connived, finagled, and attempted to be first to the patent office; but this conspiracy was found out, and all connected with it were discharged. Even Anthony Kribs participated in this conspiracy, but due to his brother's influence, he was not fired.

So--there Brookfield was in the summer of 1894 with no superintendent or assistant superintendent and looking for a draftsman. This, to be sure, was a great loss to the Brookfield Glass Company, since during this time their yearly output of insulators numbered in the millions. There were only three glass companies making insulators at this time, and with the new Kribs Press, Brookfield surely intended to establish himself as the leader in the field of electrical insulation. As is noted in court records of the time, "The Kribs press superseded all others, and went at once into general use, both by reason of increased output as well as better work. Insulators made according to previous methods were practically unsaleable, costing too much and not coming up to the mark." Even the Hemingray Glass Company was forced to take a license to use this machine.

Shortly after the fateful day at the Brookfield Glass Company, Charles Jordan made application for a patent, claiming the invention as his own, but dropped it when it was thrown into interference with the

application of Kribs, which was subsequently filed on July 5, 1894, as noted earlier.

Court records go on to tell us that "two years later, Jordan and Pease organized a company to exploit the device" for making screw insulators. In the *Commoner & Glassworker*, Pittsburgh, Pennsylvania, dated February 8, 1896, we find Jacob Pease as vice president and Charles J. Jordan as superintendent of the glass company that made the insulators which are lettered "B.G.M.Co." An excerpt from that issue's article, "Green Glass News From Baltimore", follows:

*At Westport, in the thirteenth district of Baltimore County, just across the Patapsco River, is being built a glass manufacturing plant. The capitalists are from N.Y. and Chicago and after looking Baltimore over, found this location to be the best and most convenient.*

*The factory is being erected near the water edge of the Middle Branch and the tracks of the B & O are being laid into the yard of the works. A double force of labor was put on yesterday, as the company wants to have it finished by summer.*

*This is said to be the only plant in Md. that will manufacture and use a patent on simplex glass, stoppered and metal screw-top bottles and fruit jars. The company will also manufacture flint glass and amber glassware. Electrical supplies, such as battery jars, insulators, etc. will also be made. The name of the company is the BALTIMORE GLASS MANUFACTURING COMPANY. The following are the officers: J.A. Oaks, pres.; Jacob Pease, v.p.; Edward Stabler Jr., treas.; I.I. Van Diehl, sec.; I.B. Whitlick, gen. mgr.; Charles J. Jordan, supt.*

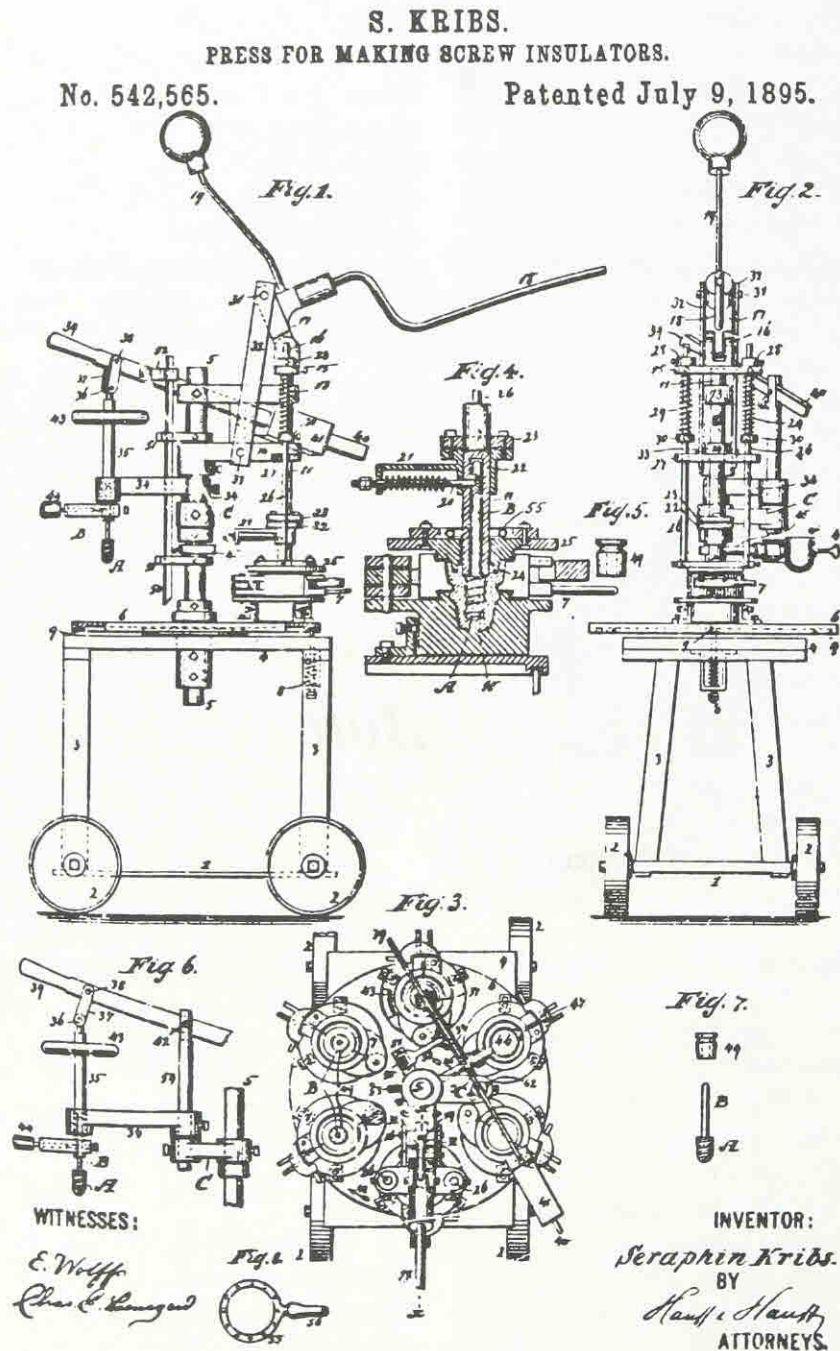
*About 200 men will be employed and the gangs will work both day and night.*

We must wonder just exactly how they went about making insulators on a machine that was in reality patented by S. Kribs and owned by William Brookfield. Obviously they did, because to be in any way competitive with respect to quantity and quality they would have had to use this patent process. [Litigation attempts were] made to prove Jordan the original and sole inventor of the Kribs Press, but this was postponed and tied up for years, with the courts eventually ruling in favor of Kribs.

One would suppose that B.G.M.Co. was able to foresee the outcome of this court test and stopped insulator-manufacturing operations to minimize any damages and

legal expenses they might be ordered to pay if Brookfield were to bring patent infringement proceedings against them. In any case, Brookfield came into ownership of the molds from this ill-fated operation as is evidenced by Brookfield insulators with the B.G.M.Co. ghosting. B.G.M. Co. embossings have been located on CD's 102, 133, 134, 145, 162 and 164. They are made of a purple glass

with a fewer number having been manufactured in a near clear color and a shade of light lemon. B.G.M. Co. ghostings have been found on aqua Brookfield units in CD's 102, 145 and 162. It is not known how long the Baltimore Glass Manufacturing Company was in business. It is believed they last made insulators in 1903.



(Figure 1.) The July 9, 1895 patent granted Seraphin Kribs for a press for making screw-type insulators.

The research and authorship of this chapter belongs to J. Dennis Donovan of Muncie, Indiana. Dennis, a former employee of Hemingray's Muncie, Indiana, plant and researcher, has unlocked much of the history associated with Hemingray as well as other Indiana and historically significant insulator manufacturers.

# NEW ENGLAND MANUFACTURERS

## Introduction

Glass insulators manufactured or used in the Boston area are known in more embossings and manufacturers' names than those native to any other region in the United States. Some have unique designs; a few have special types of pinhole threading; and still others are found in very attractive colors, making many of these specimens particularly desirable collectors' items.

The most prominent individual in the history of Boston area glass insulator production is Samuel Oakman. Mr. Oakman invented several insulator designs which were very different from others used in their day. Without his patents, the progress of insulator design into the 20th

century might have taken a very different path. Each of his insulator patents represents a small but important historical glimpse of Mr. Oakman's ingenuity.

Boston glassmakers were very active during the 1870-1900 period. Complete records of these early events have been difficult to obtain. A number of questions remain about these manufacturers and the insulators they made.

Hopefully, the information provided will enable future researchers to assemble a complete chronological history about glass insulator production in the Boston area during the early days of the telephone and electric light.

## *The Influence of Samuel Oakman .... at Boston Bottle Works*

No other glassworks ever produced more unusual styles of insulators than those made by the Boston Bottle Works. These interestingly-designed insulators were produced in the early days of the threaded pinhole glass insulator.

Most Boston Bottle Works insulator designs are unique. Although the majority of Boston Bottle Works insulators are of aqua glass, some have been located in beautiful shades of amber and green. In addition, many have three or four segmented pinhole threading and are usually embossed around the base of the pinhole or on the rim of the inner skirt.

In studying and researching the Boston Bottle Works and early Boston area glass insulator production, no other name is encountered so frequently and prominently as that of Samuel Oakman.

Samuel Oakman was born in February 1822, to Mr. & Mrs. Samuel Oakman of Charlestown, Massachusetts. By the late 1840's he had gone into business with Benjamin Eldridge, establishing a dealership in coal, wood, and kerosene. Their office, as well as a bonded warehouse, was located at 99 State Street, Boston. Mr. Eldridge passed away in 1865 but the Oakman & Eldridge

business remained in operation until the late 1870's.

During the years when Samuel Oakman was active in Boston area glass factories, the principal items he produced were bottles, demijohns, and insulators.

Between 1868 and 1904, Mr. Oakman was granted 22 patents. Many of them dealt with bottle-making and related equipment, while several involved insulator designs. Some of these designs are still utilized today in the manufacture of porcelain insulators, notably his June 17, 1890 saddle groove and November 13, 1883 inner skirt patents. (Figure 1.)

The Boston Bottle Works story begins with the Massachusetts Glass Company. It was listed in the Boston *City Directory* from 1869 to 1871. The company was formed during May 1867, with Samuel Oakman as its president. Mr. Oakman was listed as "agent" in the 1868 Boston *City Directory* and as "treasurer for glass company" during 1869 and 1870. On March 23, 1869, he was granted his first patent for a glassmaking furnace, nearly two years after the Massachusetts Glass Company's organization.

During 1869 the Massachusetts Glass Company's office was at 99 State Street, the same location as the

## SAMUEL OAKMAN PATENTS

PATENT #	DATE	REGARDING
88,066	March 23, 1869	Glass Furnace
105,834	July 26, 1870	Insulator with Slotted Pinhole
117,320	July 25, 1871	Chimney
132,214 and 132,215	October 15, 1872	Segmented Thread Insulator
187,725	February 27, 1877	Method of Molding Glass
208,487	October 17, 1878	Bottle Stopper
247,100	September 13, 1881	Method of Forming Threads
262,241	August 8, 1882	Weaving Machine
287,049	October 23, 1883	Bottle Cover
288,360	November 13, 1883	Double Petticoat Insulator
292,942	February 5, 1884	Basket Splint Machine
14,674 *	February 12, 1884	Beehive Design Insulator
304,021	August 26, 1884	Mold for Insulators
430,296	June 17, 1890	Saddle Groove Insulator
434,879	August 19, 1890	Threads/Rings Inside skirt
451,950	May 12, 1891	Eyes for Tie Wire Insulator
486,182	November 15, 1892	Glass Mold
547,936	October 5, 1895	Bottle Stopper
561,912	June 9, 1896	Packing Case for Bottles
693,056	February 11, 1902	Fruit Jar **
755,056	November 29, 1904	Insulator
362,477	August 8, 1887	Issued to John J. Coughlin, assigned 3/4 to D.J. Hern, J.M. Pendergast, and Samuel Oakman for Electric Police Alarm Callbox

\* Design Patent

\*\* Assigned 1/2 to Angeline Oakman

(Figure 1.) *Tabulation of Samuel Oakman's patents.* (Compiled by William Snell, Rochester, New York)

Eldridge & Oakman partnership. The Massachusetts Glass Company moved its offices to 29 Kilby Street in 1870, and during the following year they moved to 51 Water Street.

Samuel Oakman's first patent which concerned insulators was granted to him on July 26, 1870. (Figure 2.) The vintage specimens produced using this patent have an unthreaded pinhole with a long, rectangular slot or indentation vertically extending on opposing sides of the pinhole. They were produced for mounting upon special matching wooden pins which expanded in their upper section. These pins had a wedge which was forced into a slot in the top of the pinhole and caused the pin to expand and spread to fit snugly within the insulator's two recesses. Apparently, this idea was Oakman's answer to threadless insulators, since he claimed within his patent that his insulator "can not be revolved and work itself loose, as is common to the insulator now used."

These insulators were not very successful since special pins were required to mount them. Also, there is speculation that these insulators did not remain on their pins for long periods of time due to expansion and contraction within the wood pins and vibrations of the line wire. This made these insulator styles a rather short-lived production item, which are known in the CD 728.7, 728.8 and 796 designs.

Most of these three early Oakman styles are embossed with the July 26, 1870 patent date. Some CD 728.7 and CD 728.8 insulators have also been located and are unmarked. They are otherwise identical to their "July 26, 1870"-embossed counterparts.

The *City Directory* listings did not specify the product line of the Massachusetts Glass Company. However, there is little doubt that the earliest Oakman insulators were manufactured there. These specimens consist of CD 728.7, 728.8 and 796, and all are a threadless design with a slotted pinhole.

In 1870 Samuel Oakman sold some property to the Massachusetts Glass Company. At about that same time, a factory was built on Mystic Avenue in North Somerville, which later became the location of the Boston Bottle Works.

The Boston Bottle Works was listed in the Boston *City Directory* during the years 1872-1877. It is possible the organization existed during the latter part of 1871 while the 1872 directory was being prepared for printing.

From 1872 to 1877 Samuel Oakman was listed as "agent" for the company. Their salesroom initially was at 49 Water Street, Boston, and later at 97 State Street. (Figure 3.) Efforts to locate remains of the Boston Bottle Works factory dump have not been successful. Unfortunately the plant site is now covered by an interstate highway.

It is not known who the other company officers were. It is very likely that Samuel Oakman, listed as "agent", played a significant role in overseeing glass production at the Boston Bottle Works. Apparently, insulators were never a major production item for the company since they referred to themselves as "manufacturers of carboys, demijohns, fruit jars, druggists wares & c." No listings have been found for the Boston Bottle Works after 1877. It is apparent the company was experiencing

S. OAKMAN.  
INSULATOR.

No. 105,834.

Patented July 26, 1870

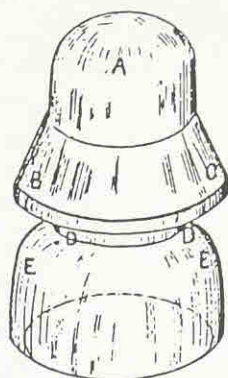


Fig. 1.

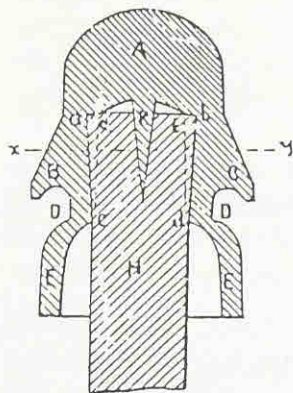
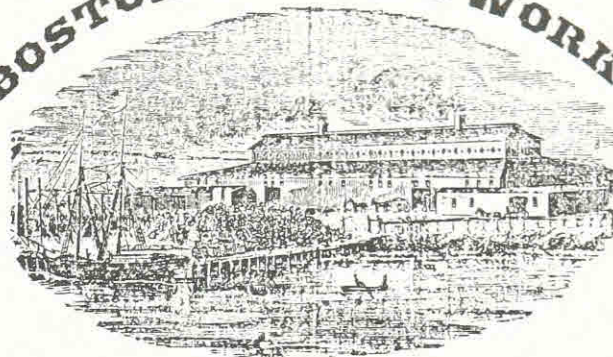


Fig. 2

Witnesses: *Samuel Oakman* Inventor  
*Franklin Parker*  
*E. D. Nicholson*

(Figure 2.) Oakman's July 26, 1870 "slotted pinhole" patent illustration. (See CD 796)

**BOSTON BOTTLE WORKS.**



MANUFACTURERS OF

**Green, Black, and Amber Glass Ware,**

CARBOYS, DEMIJOHNS, FRUIT JARS, DRUGGISTS' WARE, &c.

Salearoom, 49 Water Street, Boston. . . . . Works, Mystic Avenue, Somerville.

SAM'L OAKMAN, Agent.

Particular attention paid to PRIVATE MOULDS, and furnished when desired.

(Figure 3.) 1872 Boston Bottle Works ad (above) and 1876 Boston Bottle Works ad (below) from the Boston City Directory.

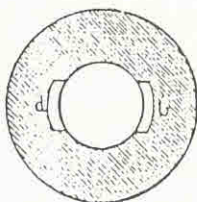


Fig. 3.

**BOSTON BOTTLE WORKS,**

MANUFACTURERS OF

GREEN, BLACK, AND AMBER

**GLASS WARE,**

Carboys, Demijohns, Fruit Jars,

**DRUGGISTS' WARE, &c.**

Salearoom, 97 STATE STREET, BOSTON.

Works, MYSTIC AVE., SOMERVILLE.

SAMUEL OAKMAN, Agent.

Particular attention paid to PRIVATE MOULDS, and furnished when desired.

some financial difficulties, eventually bringing the plant to a close.

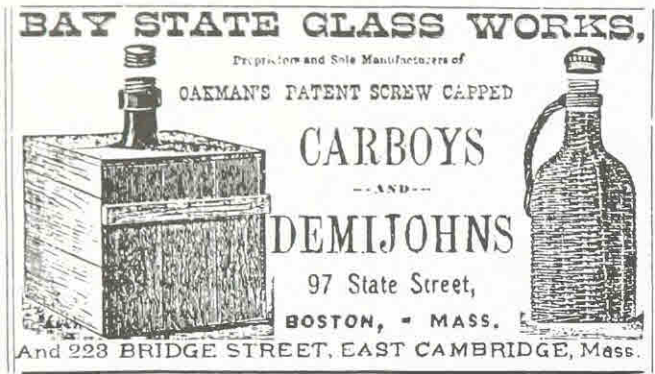
When the Boston Bottle Works ceased business in 1877, a group of investors organized and formed the Bay State Glass Works in 1878. It is not known what became of the Boston Bottle Works facility in Somerville, but it was probably sold or torn down. The 1878 and 1879 Boston city directories indicate that Mr. Oakman was "agent" for the Bay State Glass Works and in the 1879 City Directory, Bay State is listed under the heading "Insulators".

Bay State's salesroom was located at 97 State Street, Boston, the same location that had been occupied by Boston Bottle Works. The Bay State Glass Works factory was located at 223 Bridge Street, East Cambridge.

The company advertised its wares as "Oakman's Patent Screw Capped Carboys and Demijohns". (Figure 4.)

No insulators are known to exist with Bay State Glass Works embossing. Specimens made there were probably unembossed, or were only lettered with Samuel Oakman's October 15, 1872 patent date. These styles are identical to those made by the Boston Bottle Works and also have segmented threading. It is unknown what became of the Bay State Glass Works after 1879. Apparently they closed their doors during the early part of that year.

Virtually all insulators produced by the Boston Bottle Works are embossed around the base of the inner



(Figure 4.) 1878 Boston City Directory ad for Bay State Glass Works.

skirt, or around the flat collar area at the base of the pinhole (on insulators having no inner skirt). (Figure 5.)

Base embossing exceptions consist of rare examples which have lettering around the crown. In addition, at least two known specimens of the CD 796 style are embossed "BOSTON BOTTLE WORKS/No. SOMERVILLE/MASS" on the front skirt and "OAKMAN" (in an arc) / "JULY 26 '70/PATENT" (in an upside-down arc) appearing on the rear skirt. This piece is also lettered "OAKMANS PATENT JULY 26 1870" around the base of its slotted pinhole. Since this insulator has the 1870 patent date embossed on it twice, Samuel Oakman probably wanted everybody to know it was his patent!

The CD 796 is a very peculiar and interesting style. Although some collectors refer to this design as a transposition, it was not intended as such. The July 26, 1870 patent text refers to this insulator design as a modification of the typical threadless "hat" design popular in those days. Its flaring top acted as a protective shield or umbrella to keep the lower part of the insulator dry during wet weather to achieve better line wire insulation. These specimens, interestingly enough, do have a wire groove above and below the insulator's protruding, flaring ridge.

Mr. Oakman favored lettering his insulators around the base, a characteristic which is almost his personal trademark. (Figure 5.) Base lettering on glass insulators, however, dates back to the days before Samuel Oakman started to mold his insulators. Threadless examples have been located in Canada with base embossing, produced by glassworks in that country. After Mr. Oakman

(Figure 5.) Example of embossing found on Boston Bottle Works insulators.

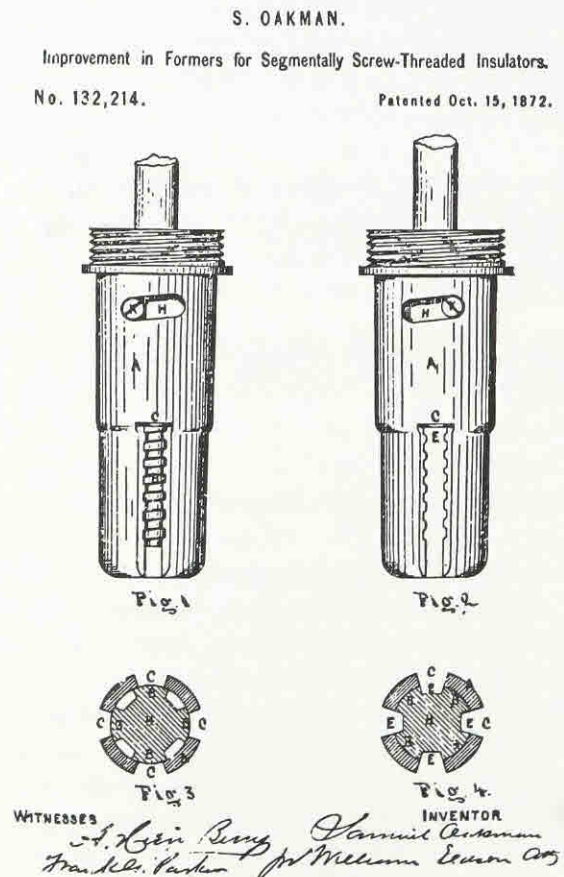


stopped making insulators at the Boston Bottle Works plant, he continued to letter his insulators around their bases until his insulator-manufacturing career ended at the Oakman Manufacturing Company in 1897.

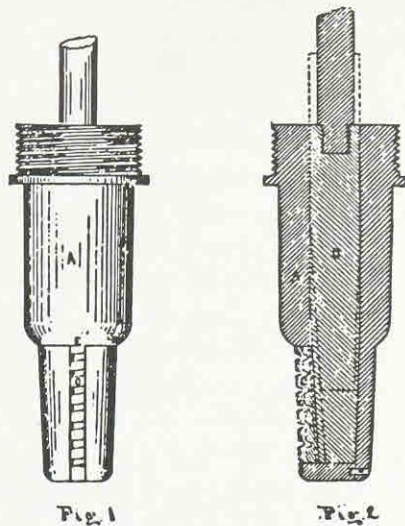
On October 15, 1872, Samuel Oakman was granted two separate patents for methods of forming screw threads in glass insulators. Entitled "Improvements in Formers for Segmentally Screw-Threaded Insulators", one process resulted in insulators with four segmented threads, and the other produced specimens having three segments. The two separate inventions allowed the plunger to be removed from the insulator without having to unscrew it. Each patent provided screw thread formation within the insulators in a quicker, simpler manner, saving production time and manufacturing costs.

The four-segment threads were produced by a threaded plunger having four equally-spaced slots. Within each slot was a threaded segment. The plunger was inserted into the molten glass, turned 90 degrees, and after the quarter-turn, the threading segments collapsed inside a hollow tube which was the primary central section of the plunger. The tube was then pulled out of the insulator, forming a pinhole with four-segment threads. (Figure 6.)

The three-segment threads were produced by a different process. The tubular plunger in this case had three slots, each having a threaded segment. The inner portions of these segments, which were toward the center of



(Figure 6.) Oakman's October 15, 1872 patent to form four-segment pinholes.



WITNESSES

*A. Leon Berry*  
*Frank H. Parker*  
*Samuel Oakman*  
*for William Brown City*



FIG. 8.

INVENTOR

## INSULATORS.

The cut here shown represents the "PATENT SECTIONAL THREAD INSULATOR," which is considered far superior to any other form of Screw Glass Insulator now in use. The following are some of the advantages claimed for this Insulator over all others. 1st.—It will cut its own thread upon a plain pin or bracket, or fit the thread upon any that are cut of the regular uniform size. 2d.—It touches the pin only in three places; consequently has less contact with the wood and of necessity offers more resistance to the passage of a current to the pole and ground. 3d.—It allows free circulation of air into the insulator and will dry out much sooner than any other. 4th.—It is of light colored glass, and bugs, spiders and insects will not burrow in it. 5th.—It is strong, symmetrically proportioned, and pronounced by all Telegraph Superintendents who have adopted it upon their lines to be the "perfection" of all glass Insulators. This Insulator can be made with an extra flange or petticoat upon the inside, which will add materially to its insulating qualities by increasing the distance of glass surface to the pin. Liberal discount to the trade.

PARTRICK &amp; CARTER,

Sole Agents,

38 S. Fourth St., Phila.

Insulator.—Full Thread, each.....10 cents  
 " Sectional Thread, each.....10 "  
 " Plain " ".....5 "

Insulators.—Hard Rubber, Petticoat Pattern, each, .....22 cts.  
 " " Western Union, " .....25 "  
 Brackets.—For Screw Glass, each.....4 "  
 " " Plain " ".....3 "  
 Cross Arm Pins.—For Screw Glass, each.....4 "  
 " " " " Plain " ".....3 "



(Figure 8.) 1880 Partrick & Carter catalog featuring segmented-threaded insulators.

(Figure 7.) Oakman's October 15, 1872 patent to form three-segment pinholes.

the plunger, were grooved so that they would grasp the shaft which extended through the plunger. The shaft was tapered from top to bottom, narrowest at the base. The inner shaft was drawn upward after the molten glass was left to cool. The segments were attached to the tapered shaft and were gradually drawn inward as the plunger was pulled out of the pinhole so as not to disturb the newly formed threads. (Figure 7.)

Evidently, insulators with segmented threads were still being produced at least through 1880, three years after production ceased at the Boston Bottle Works. These insulators were manufactured by an unidentified glassworks with which Samuel Oakman was involved from mid-1879 through 1880 or 1881.

In 1880 Partrick & Carter, a well-known telegraph supply firm in Philadelphia, Pennsylvania, illustrated an insulator closely resembling the CD 136.7 in its catalog. The accompanying text referred to this as the "Patent Sectional Thread Insulator", that "can be made with an extra flange or petticoat upon the inside, which will add materially to its insulating qualities by increasing the distance of the glass surface to the pin." In other words, their insulators were available with or without inner skirts. (Figure 8.)

The fact that these insulators were available to accommodate a customer's specific requirements suggests rather strongly that insulators with segmented threads were still being manufactured during 1880 and that Partrick & Carter was not merely selling leftover Boston Bottle

Works or even Bay State Glass Works stock.

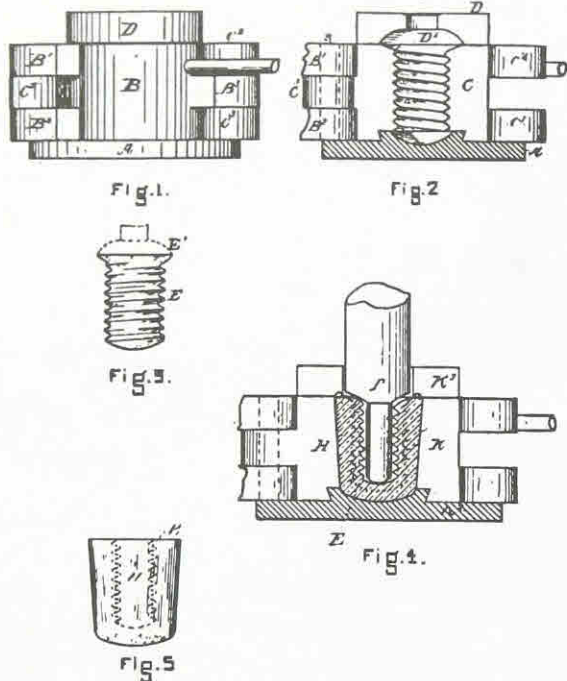
Further statements made in the Partrick & Carter ad were clearly their own promotional claims for the insulators and were not design factors in Samuel Oakman's mind when he invented his segmented-threading processes. (Figure 8.)

Some Boston Bottle Works insulators are more common with three-segment threading in certain styles. Other designs are more prevalent with four segments. It is possible that insulators with segmented threads did not perform well due to loosening from the pins since there was significantly reduced insulator-to-pin contact. This may have prompted Mr. Oakman to develop his first full-threading patent, granted to him on September 13, 1881. (Figure 9.)

The earliest Boston Bottle Works insulators, all of which have segmented threads, include the lettering "PATENT APPLIED FOR" or "PATENT APLD FOR". These embossings are known in several styles (see Embossing and Detail Chart for Boston Bottle Works Insulators). After Mr. Oakman received his October 15, 1872 patent, he probably changed his molds to include the 1872 patent date on the insulators. These later specimens were most likely made between 1873 and 1877.

The CD 136.7 and one of the CD 158 styles are lettered only with "PAT. OCT. 15, 1872". Both of these have three-segment threading. These insulators were most likely made during 1880-1881 for Partrick & Carter, possibly by a glasshouse in the Boston area. Insulators

S. OAKMAN.  
 PROCESS OF FORMING BOREWS IN ARTICLES OF GLASS.  
 No. 247,100. Patented Sept. 13, 1881.



WITNESSES  
*Franklin Parker*  
*William M. Ferguson*

INVENTOR  
*Samuel Oakman*

(Figure 9.) Oakman's Sept. 13, 1881 patent. The insulator's threading was first formed within a glass thimble and then inserted within the insulator's unthreaded cavity while it was still hot.

produced by Samuel Oakman during his earlier 1878-1879 association with the Bay State Glass Works probably were either unembossed or simply had the October 15, 1872 patent date, with the Boston Bottle Works lettering removed from the molds.

There are a few CD 156.2 specimens which are embossed with Samuel Oakman's October 15, 1872 patent date. They are of special interest because they bear reference to his segmented-threading patent while actually having full threads. The threading within these insulators appears to have been formed by Samuel Oakman's September 9, 1884 patent process. Perhaps Samuel Oakman embossed these with the 1872 patent so the observer would think the process of forming the full threads was protected by that patent, while the 1884 patent was still pending.

The identity of the manufacturer of the CD 156.2 remains a mystery. These insulators very well could have been products of Samuel Oakman's early 1880's glassmaking ventures, which might represent prototypes of his September 9, 1884 patent process.

Most Boston Bottle Works insulators are of aqua glass. The second most common color is emerald (or dark) green, probably a result of using overruns of glass intended for producing fruit jars and bottles, which were also made by Boston Bottle Works. Many of the greens, ambers,

olive greens, and emerald greens are lettered "PATENT APPLIED FOR", while those embossed with the October 15, 1872 patent date are found mostly in aqua. This suggests that many of the earlier pieces were produced in "colored" glass while later production (after Oakman received his 1872 patent) was predominantly aqua. Note in the 1872 advertisements that the Boston Bottle Works offered "Green, black and amber glass ware." (Figure 3.)

Another unique characteristic of Boston Bottle Works insulators is their six-sided (hexagonal) crowns. These may have been designed so the lineman could firmly grip the insulator while fastening or removing it from its mounting pin.

Perhaps the most interesting and unusual style produced is the barrel screw-top (CD 158.9). Although we have no documentation of what the insulator's spiralling crown was intended for, the accompanying illustration shows the author's concept of how these could have been used. (Figure 10.)

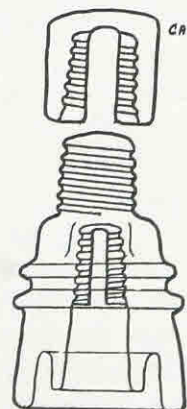
A glass or wood cap with threads to match the crown and a wire groove slot in each side of the cap could have been fastened onto the insulator's screw-top dome while the insulator was turned onto its mounting pin, with the line held in the top of the stationary cap or pulled through the opening later.

This "no tie wire" design might not have been too successful due to breakage caused by friction occurring between the insulator and cap, or the vibrations of the line wire within the glass-to-cap slot. A few CD 158.9 insulators in collections have some chipping around the crown's threading, suggesting that a mating piece could have been used with these specimens.

No patent information has been located concerning this style, and it is possible the insulators were produced in limited numbers as prototypes for testing in the field. Due to their supposed failure, the CD 158.9 probably was never patented and was not an ordinary production item.

Note that a regular wire groove was provided at the base of the crown's threads. Undoubtedly this was included so the lineman could attach the line wire to the insulator in the conventional manner, should the insulator's crown become damaged, or if the mating cap was missing or broken. The insulator also has a hexagonal exterior between the crown's threading and wire groove.

(Figure 10.) Author's concept of screw-mounted cap with slot opening for receiving line wire that might have been used with the screw-top crowned CD 158.9 insulators.





Very few barrel screw-top insulators have been located. Many of those in existence surfaced during the late 1960's through the 1970's, primarily in Alabama, Florida, and Georgia. These specimens are aqua, any of numerous green shades (ranging from light to dark emerald green), and amber. The latter is probably the most exciting Boston Bottle Works variant known to collectors.

Another interesting base-embossed insulator is lettered "CHESTER - 104 CENTRE ST. N.Y. - PATENTED". These insulators are the CD 158.1, have segmented threading, and a wavy wire groove which was used to support a metal fitting to which the line was attached. These were products of the Boston Bottle Works, made on special order for the Chester telegraph supply firm.

Chester existed in New York City, initially at the corner of White and Leonard Streets. They were a well-known distributor of telegraph equipment and related supplies, with the organization beginning operation in 1855. About ten years later, their office address was changed to 104 Centre Street, New York City. At that time they also offered services as telegraphic engineers. The Chester brothers' firm remained in business through the late 1870's, and although they referred to themselves as manufacturers, most of the products they sold, including the insulators, probably were made for them by other companies.

Despite their Boston origin, the author knows of no reports of Boston Bottle Works insulator acquisitions in the Boston area, and very few of these insulators have been found in Massachusetts. The majority of known specimens have been located in rather diverse locations, such as Ohio, New York, Michigan, and a number of states in the South. It is apparent that Boston Bottle Works insulators were widely distributed throughout major portions of the United States, and why they haven't been found in their native area remains a mystery.

## ... at American Insulator Company

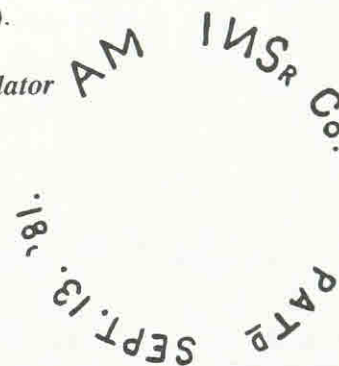
During the years 1885 and 1886, Samuel Oakman was listed in the New York *City Directory* at 2 Wall Street, which was also the office address of the American Insulator Company. During the same two years, there was an American Insulator Company listed in Boston, at 26 Equitable Building. It is very possible these were both the same company, and that Samuel Oakman was associated with both operations. Mr. Oakman also owned a bottle dealership at 219 State Street, Boston, during 1885-1886, but no mention is made within city records of anything about insulators.

Just when American Insulator Co. specimens

were first made remains unknown. However it seems likely that production commenced during 1883 or perhaps a little earlier, since the American Insulator Co. is mentioned in Oakman's inner skirt patent, granted on November 12, 1883. The location(s) of the glassworks that made insulators for the American Insulator Company in both New York and Boston has not been determined so far. However, it seems very probable that at least some, if not all of the nine American styles known to date were manufactured somewhere in the Boston area. Like most insulators made under Samuel Oakman's direction, American Insulator Company specimens are lettered around the base rim.

There are two distinctly differing styles of American Insulator Company base lettering. One has larger, bold letters (Figure 1.), while the other has small, fine and concise lettering (Figure 2.).

(Figure 1.) American Insulator Co. larger base lettering as seen on the CD 134.

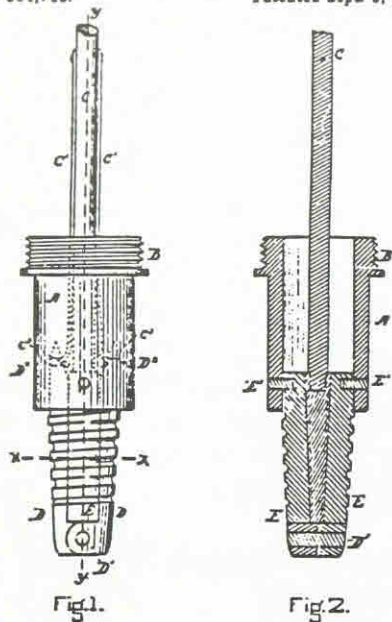


(Figure 2.) Smaller, fine lettering which appears on American Insulator Co. CD 160.7 insulators.



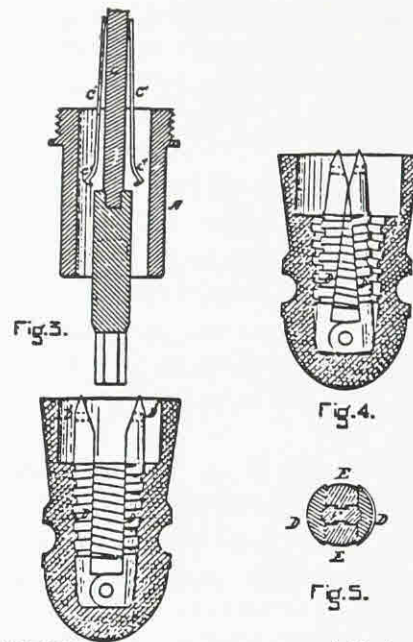
The insulators with the smaller letters have New York abbreviated "N.Y." on them. The examples with the larger, bold letters bear no such reference and are likely the ones which were manufactured in the Boston area. It also seems probable that the large-lettered units are somewhat older than their small-lettered counterparts. This is based upon the fact that the Americans with the large lettering are embossed with Oakman's September 13, 1881 patent date and appear to have been made by that threading process. (See Boston Bottle Works, Figure 9.) The majority of American insulators produced by Oakman's subsequent threading process, patented on September 9, 1884, have the smaller lettering on them.

One can usually determine the difference between Oakman's 1881 and 1884 patent threading methods.



WITNESSES  
Frank H. Barker  
Flaher M. Ferguson

INVENTOR  
Samuel Oakman



WITNESSES  
Frank H. Barker  
Flaher M. Ferguson

INVENTOR  
Samuel Oakman

(Figure 3.) Oakman's September 9, 1884 threading process patent. Insulators produced under this patent usually have "fade away" threading toward the top of the insulator's pinhole and two small round dots approximately 1/8 of an inch in diameter on the sides of the pinhole's upper section. This characteristic was formed by the hinged threading mandrel used in the patent process.

Insulators manufactured using his September 13, 1881 patent are somewhat crude in general appearance and usually are not threaded in the upper quarter of the insulator's pinhole. The threads are rather well-defined in most cases. CD 134 Americans are examples of the 1881 patent threading.

Oakman's September 9, 1884 threading process (Figure 3.) created finer threads which seem to gradually fade away as they reach the top of the pinhole. There are also a pair of vertical lines going up each side of the pinhole with a small dot on each side of the pinhole's upper section.

Some unembossed insulators have been attributed to American Insulator Co. manufacture because they have threading similar to embossed Americans. These are: CD 105, 126.3, 134, 134.4, and 145. Also, a very few CD 156.2 specimens have been located with Oakman's 1884 patent threading, and these are lettered with Oakman's October 15, 1872 patent date. (Please refer to the Boston Bottle Works section for details about this piece)

American Insulator Company designs were commonly used for telephone, telegraph and electric distribution during the 1880's. Several of these styles are unique to the company's manufacture, such as the CD 105, 156, 156.1, and 160.7. None of these are common.

A few American styles are highly unusual. The

author has seen an American Insulator Co. variant identical to the CD 145 except that it has no inner skirt! This is a CD 143.4 (A few CD 143.4 Brookfield insulators of similar vintage have also been located) Also unique is the CD 160.4, which is the same insulator as the CD 160.7, and this one, too, has no inner skirt. Although we have no explanation for these peculiar inner-skirtless versions, it is possible the moldmaker forgot to include the inner skirt section of the molding plunger before forming the insulator.

Another unique insulator, which possibly was manufactured by the American Insulator Company, is unembossed, threadless, and otherwise identical to the CD 134 American. The reason for this variation remains a mystery. Possibly the insulator was a mistake produced by a factory worker who forgot to insert the threaded glass thimble within the insulator's unthreaded inner portion, which otherwise would have formed the internal threads within the pinhole. Remember that the threads were made separately and inserted within the insulator later, as covered by Oakman's September 13, 1881 patent. Another possibility is that this insulator was intended as an early replacement for use on threadless pins, like the Brookfield CD 733, embossed with the 1865 Cauvet patent date.

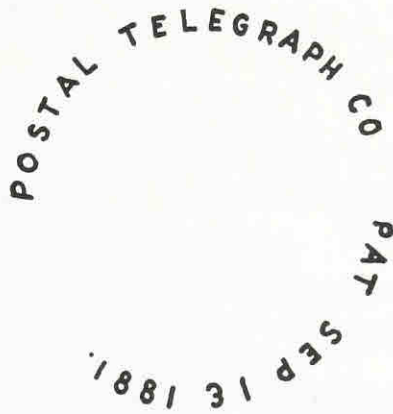
The glass mixtures used in manufacturing American Insulator Company pieces were frequently inconsistent, and cullet (scrap glass) was used in the glass batch, which often resulted in an impressive, colorful

assortment. Generally, American insulators are of light aqua, light blue, or light greenish glass. The more colorful variants, which are not commonly found, include emerald green, olive green shades, yellow amber, yellow green, and amber.

Other insulators almost certainly made by the American Insulator Company are those of the CD 156.1 style lettered around the base rim "PAT. SEPT. 13. 1881." These specimens are otherwise identical to their American Insulator Company-embossed counterparts.

In addition, there is virtually no doubt that American manufactured some CD 156 and 156.1 insulators on special order for the Postal Telegraph Company. These specimens, like the above CD 156.1 units, are identical to the CD 156 and 156.1 Americans. The Postal insulators are lettered "POSTAL TELEGRAPH CO. PAT. SEP. 13 1881" around their base rims. These pieces are of light aqua or light greenish glass and are not extremely rare. (Figure 4.)

(Figure 4.) Base lettering as observed on the CD 156.1 Postal Telegraph Co. Note the backward "3" in the patent date.



## ...at Oakman Manufacturing Company

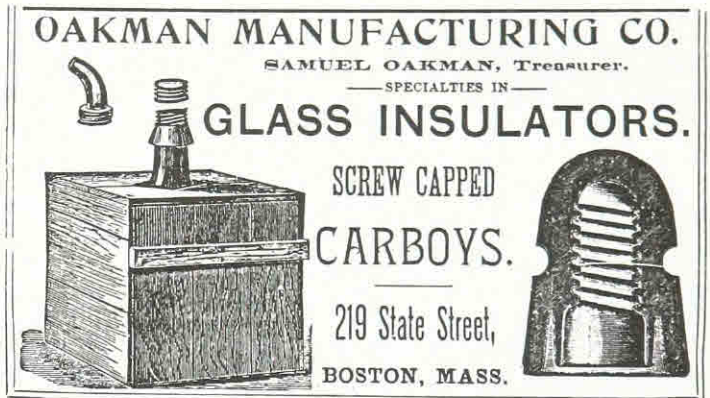
In the Boston city directories we find that Samuel Oakman was again engaged in his own glassmaking with the Oakman Manufacturing Company, in operation from 1890 through 1897.

Oakman's glass factory stood on Mercer Street in South Boston and the office address was 219 State Street, Boston, during at least a portion of the company's seven-year existence. Samuel Oakman was treasurer for the organization during most of those years. (Figure 1.)

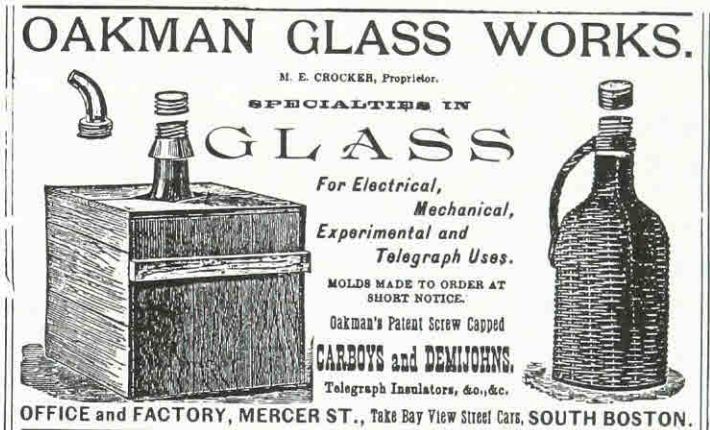
In 1892 the company briefly changed its name to the "Oakman Glass Works." (Figure 2.) The change of the company's name and proprietorship during 1892 has not been explained. It is possible the Crocker Bank took charge of the Oakman Manufacturing Company and kept it in operation to help recover loan losses and debt. There probably was some financial association between the Crocker Bank and the Oakman Manufacturing Company, since

Richard Nickerson Oakman, Samuel Oakman's cousin, was an officer at the Crocker Bank during that time.

In 1893, the organization's name was changed back to the "Oakman Manufacturing Company" and Samuel Oakman returned, again in charge of the business. (Figure 3.)



(Figure 1.) Oakman Mfg. Co. advertisement which was illustrated in the 1893 Boston City Directory.



(Figure 2.) A listing for the Oakman Glass Works is noted for the year 1892, with Mr. M. E. Crocker, an influential Boston banker, as proprietor of the company during that year.

It is not known what happened to the Oakman plant after 1897. No census listings exist for Mr. Oakman after 1898. It is interesting to note that during 1898 at 76 years of age Oakman married his second wife. Undoubtedly, he was in the process of retiring from the glassmaking business, leaving the last of the Boston area glass insulator manufacturers, the New England Glass Manufacturing Company, to come onto the scene in 1899. So far, we have not discovered any connection between that organization and Samuel Oakman.

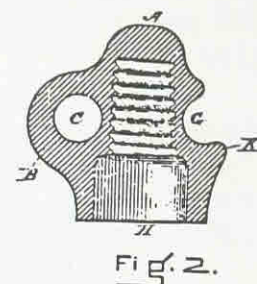
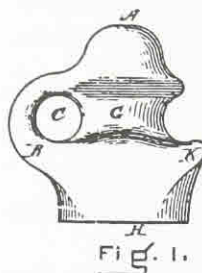
Insulator production at the Oakman plant was a successful operation from the start. Units manufactured there were mostly large, heavier styles specifically designed for supporting heavy direct current feeder cables which served subway and streetcar lines, such as the CD 140 and 269 Jumbo styles.

The CD 269 style is referred to as the "New Jumbo", and both designs were mounted on 1 3/8 inch-



S. OAKMAN.  
ELECTRIC INSULATOR.  
Patented May 12, 1891.

No. 451,950.



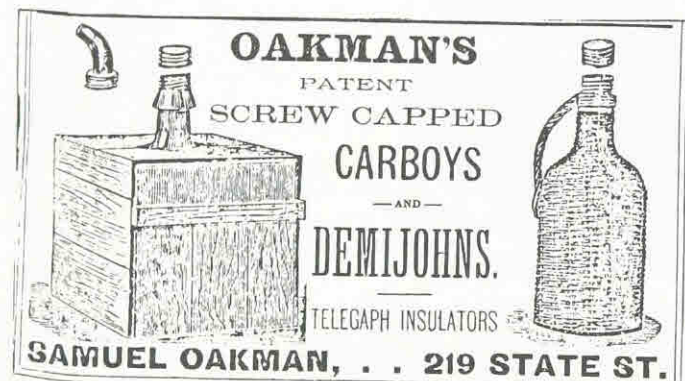
WITNESSES

*William E. Wickham*  
*William Nelson*

INVENTOR

*Samuel Oakman*

(Figure 5.) May 12, 1891 Oakman patent which covered the "Columbia" insulator design.



(Figure 3.) Two more 1890's advertisements for the Oakman Manufacturing Company.

"eye" in both of the insulator's ears. Similar insulators were produced by Brookfield and Hemingray under Mr. Oakman's patent.

Most insulators produced at the Oakman plant bear reference to his June 17, 1890 cable groove patent. (Figure 6.)

Oakman Manufacturing Company insulators are very uniform in color, usually found in aqua or light greenish glass. All are lettered around their base rims with small, neat, concise letters. Some of the CD 140 and 269 Jumbo styles have skirt embossing in addition to the usual

(No Model.)

S. OAKMAN.  
INSULATOR.

No. 430,206.

Patented June 17, 1890.

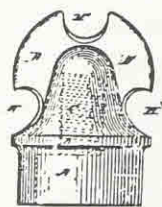
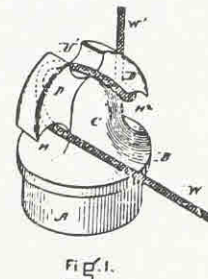


FIG. 2

FIG. 3

WITNESSES.

*Frank B. Parker*  
*William Nelson*

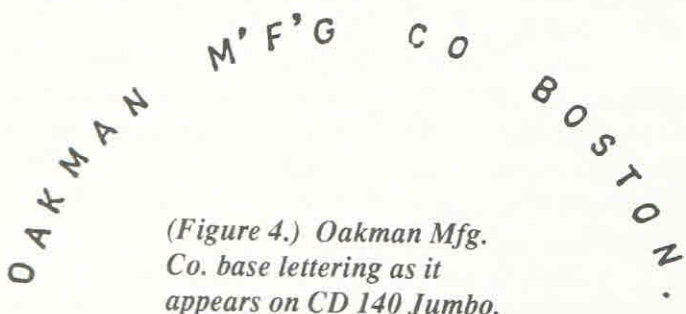
INVENTOR

*Samuel Oakman*

(Figure 6.) June 17, 1890 Oakman patent which covered the "saddle groove" insulator design.

diameter pins. A large number of CD 140 styles (see embossing in Figure 4.) were produced by Oakman for street railway service in Boston, which was rapidly expanding throughout the city about 1890. Oakman obviously was a major supplier of these insulators for transit system construction taking place in Boston, and the Jumbo insulators were mounted on special wooden pins which fit into short crossarms built into the sides of subway tunnel walls. Although all the insulators are long gone, a few of these crossarms can still be seen in a couple of the older stations.

The most commonly found specimen made by Oakman is the CD 259. Oakman also made at least one Columbia style, which is rare. These insulators were produced under his May 12, 1891 patent. (Figure 5.) The patent covered the addition of one or two "eyes" for use in holding the tie wire, while the conductor was secured in the wire groove. The Columbia design was produced with an

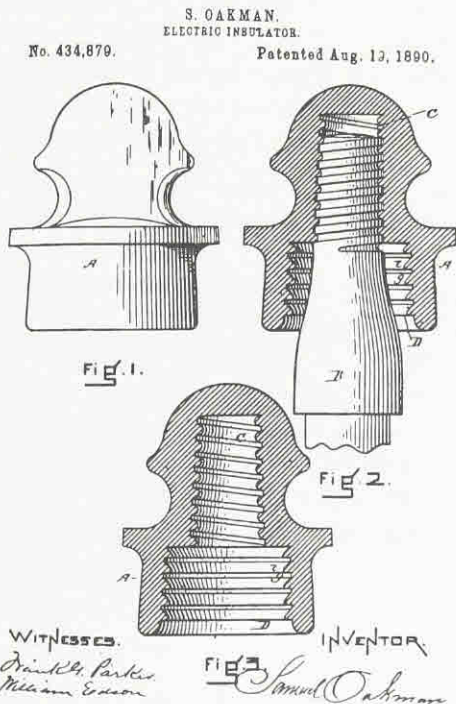


base lettering. A departure from the cable designs made by Oakman is the CD 144.5, which is very uncommon. This specimen has no Oakman lettering and is embossed "PAT'D AUG. 19. 1890" around the base of the pinhole. (Figure 7.) Judging from this specimen's color, styling, and embossing, the CD 144.5 is clearly an Oakman product.



(Figure 7.) Base lettering on the CD 144.5 insulator.

An interesting characteristic about the CD 144.5 is the ridges which spiral around the inside of its skirt. This feature, patented by Samuel Oakman on August 19, 1890, is also observed on many other Oakman Manufacturing Company designs, and was intended to help reduce moisture accumulation from occurring around the inside of the insulator, achieving better insulation. (Figure 8.) Because the ridges allowed a place for dust and soot to accumulate, and this area couldn't be cleansed by rain, it doesn't seem that this idea had much additional insulating value.



(Figure 8.) Oakman's August 19, 1890 patent which covered the ridges around the inside of the insulator's outer skirt which were to provide better insulation.

Another unusual Oakman-embossed insulator is the CD 134. Unlike other specimens made by Oakman, this rare insulator is simply lettered "OAKMAN PAT'D SEPT. 13. 81." around its base rim (Figure 9.). The style of

(Figure 9.) Base embossing on the early Oakman CD 134 style.

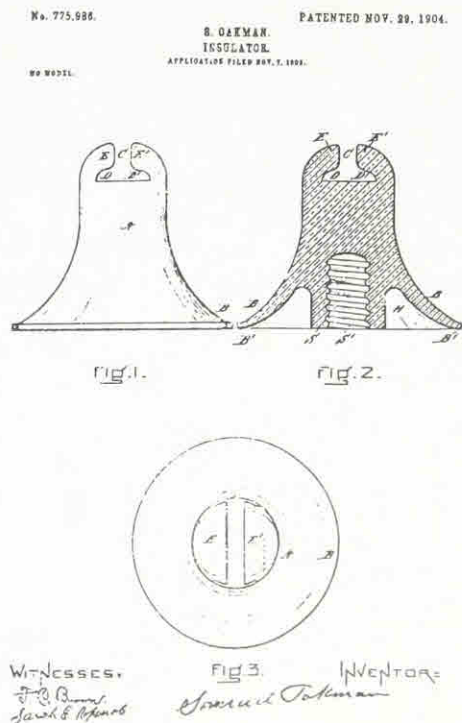


lettering on this CD 134 is much larger than those made by Oakman during the 1890's.

The threading within these insulators appears to have been formed by the 1881 patent process which covered the forming of threads separately on a glass thimble and then inserting the preformed threading into the insulator's unthreaded cavity while the glass was still soft.

This patent was granted to Samuel Oakman and assigned to Mr. Edward Sherburne, who was the proprietor of a glassworks that existed in Boston during the 1880's. Many early (circa 1881-1884) American Insulator Company insulators were manufactured by the Sept. 13, 1881 patent process, but it is not known if the base-embossed Oakman or American insulators were produced at the Sherburne glassworks. The CD 134 Oakman appears to have been produced in a retooled American Insulator Company mold of the same style. This specimen was probably produced after 1881 and before late 1884 at some location before Oakman opened his Mercer Street plant.

Mr. Oakman's last patent was one which concerned insulators and was granted to him on November 29, 1904, for an unusual insulator style. There are no known specimens of this design. (Figure 10.)



(Figure 10.) Oakman's last patent, which was for this insulator, granted to him on November 29, 1904.

## *Samuel Oakman Chronology*

c. 1848 - c. 1878: Oakman & Eldridge fuel dealership in operation.

1865: Eldridge passes away; Oakman left in charge of business.

1867: Massachusetts Glass Co. formed in May; Oakman is president.

1868: Boston *City Directory* lists Oakman as "agent".

1869: Oakman receives first of 22 patents. Patent was for glassmaking furnace.

1869-1870: Oakman is listed "treasurer of glass company".

1870: Oakman sells Massachusetts Glass Company some property. Construction of Boston Bottle Works plant commences.

1871: Massachusetts Glass Company likely became Boston Bottle Works late in year, or during early 1872.

1872: Boston Bottle Works listed in Boston *City Directory*. Oakman received patent for segmented threading process on October 15.

1877: Boston Bottle Works plant closes due to financial difficulties.

1878: Bay State Glass Works formed by a group of investors. Factory was in East Cambridge, Massachusetts. Oakman was listed as "agent".

1879: Bay State listed in Boston *City Directory* under "Insulators" heading. Bay State closes during early 1879.

1880: Oakman listed as "treasurer for glass company" in Boston *City Directory*. Unknown company affiliation. Evidence exists that Oakman's segmented-threaded insulators are still being made at some unidentified glassworks.

1881: Oakman was granted threading patent on September 13, which was assigned to Edward Sherburne who owned a glass factory in Boston. Oakman most likely worked for Sherburne at least periodically during the early 1880's.

c. 1883 - c. 1886: Oakman involved with American Insulator Company in New York City.

1884 - c. 1885: Oakman involved with demijohn and possibly insulator production at Iron Glass Company works in Haverhill, Massachusetts.

1885-1886: Oakman listed at 219 State Street, Boston, his bottle dealership, and at 2 Wall Street, New York City, the American Insulator Company address.

1887-1889: Oakman listed as a dealer of bottles and insulators at 219 State Street. No known company affiliation. Possibly he was making unembossed insulators under his September 9, 1884 patent and/or was selling leftover American Insulator Company stock.

1890-1897: Oakman Manufacturing Company in operation. Plant was in South Boston and the office initially was at 219 State Street.

1904: Oakman was granted a patent for a peculiar insulator design, his last patent. This insulator style was not put into production.

## **BOSTON BOTTLE WORKS EMBOSSING AND DETAIL CHARTS**

Tabulations describing variations of known Boston Bottle Works insulators are presented in the accompanying embossing and detail charts. The listings are fun and easy to use. The embossing chart lists all known Boston Bottle Works lettering variants, and each is assigned an embossing reference code. For each, the styles known are specified, along with information on where the embossing appears on the insulators.

The detail chart tabulates Boston Bottle Works styles by their CD Number, listing the embossing reference code letter and type of threading for each. These listings are further expanded by a tabulation of known colors for each embossing and type of pinhole threading.

The charts were complete at the time of publication and are intended as a reference guide. This information was developed by the author with the assistance of several experienced collectors who are particularly knowledgeable about Boston Bottle Works insulators and their variations. It is noted here that specimens other than those listed may exist and others probably are waiting to be discovered. Additional space has been included within the listings for your convenience so you will be able to add future descriptions.

As stated in the previous chapter, Boston Bottle Works insulators have been located in a wide assortment of colors. Listed are as many specific colors as space will permit. A few colors have been generalized, particularly aqua which includes light and dark hues, and green which ranges from medium to dark forest green shades. Some of these variants are scarcer than others. The additional space on the far right-hand side of the color chart will allow you to add additional colors of your choice.

STYLE CD #	EMBOSSING REFERENCE CODE	THREADING TYPE	COLORS														
			Near Clear	Ice Green	Light Lime	Light Green	Aqua	Yellow-Green	Yellow-Olive	Green	Emerald Green	Blue-Aqua	Blue	Dk. Green-Aqua	Olive Amber	Rootbeer Amber	Olive Green
<b>136.4</b>	M	4-segment					*	*	*	*	*	*	*				
<b>136.5</b>	F	3-segment					*										
<b>136.7</b>	K	3-segment	*	*			*	*				*					
	M						*										
<b>143.6</b>	F	3-segment					*			*		*					
<b>145.6</b>	A	4-segment										*					
	C						*				*			*	*		
	M						*										
	A	3-segment									*						
<b>156.2</b>	K	Full					*										
	M						*										
<b>158</b>	A	4-segment		*	*	*	*				*		*	*	*		
	M						*										
	K	3-segment					*										
<b>158.1</b>	L	4-segment					*				*	*					
	M											*					
<b>158.2</b>	A	4-segment					*				*						
	B						*		*	*	*	*	*	*	*		
	C										*						
	D						*										
	E						*				*						
	M						*						*				
	C	3-segment					*	*									
<b>158.9</b>	A	4-segment		*			*			*					*		
<b>728.5</b>	M	4 offset slot/lugs					*										
<b>728.7</b>	J	Slotted					*										
	M						*										
<b>728.8</b>	G	Slotted					*										
	H	Slotted					*										
<b>796</b>	I	Slotted					*										

BOSTON BOTTLE WORKS EMBOSSINGS

CD #

A	Around base of inner rim: BOSTON BOTTLE WORKS - PATENT APPLIED FOR		136.4																						
				136.5																					
B	Around base of inner rim: BOSTON BOTTLE WORKS - PATENT APLP FOR																								
C	Around base of inner rim: BOSTON BOTTLE WORKS - PATENT OCT 15 72								*																
D	Around base of inner rim: BOSTON BOTTLE WORKS - PATENTED OCT 15 72													*											
E	On crown: BOSTON BOTTLE WORKS - PATENTED OCT 15 72																								
														*											
F	Around base of pinhole (collar): BOSTON BOTTLE WORKS - PAT. OCT. 15 72			*																					
G	Around base of outer rim: BOSTON BOTTLE WORKS -- OAKMAN'S PAT JULY 26 1870																								
																						*			
H	Around base of outer rim: BOSTON BOTTLE WORKS--OAKMAN'S PATENT. JULY 26 1870																					*			
I	On skirt: BOSTON BOTTLE WORKS NO SOMMERVILLE MASS Around base of pinhole: OAKMAN'S PATENT JULY 26 1870																						*		
J	Around base of pinhole: OAKMAN'S PATENT -- JULY 26 1870																					*			
K	PAT OCT. 15 1872 *				*																				
L	Around base of inner rim: CHESTER -- 104 CENTER ST. N.Y. -- PATENTED																					*			
M	UNEMBOSSED **		*																			*			



# American Iron Glass Pipe and Plate Company

... and Joseph S. Lewis and Frank L. Pope

Among the forgotten glassmakers which operated in the Boston area, the American Iron Glass Pipe and Plate Company (also referred to as the "Iron Glass Works" or "Iron Glass Company") was among New England's larger producers of glass insulators. The Iron Glass Company manufactured insulators under contract for other insulator companies and may represent the source of many insulators whose origin is unknown. The company was organized on March 31, 1884.

During mid-December 1884, the Iron Glass Com-

pany commenced glassmaking operations in Haverhill, Massachusetts, in a large three-story brick building on the outskirts of that community. Haverhill is approximately 40 miles northwest of Boston and has been well known as a shoe-manufacturing city.

The company's newly constructed building stood adjacent to the Boston and Maine Railroad tracks (Figure 1.), and boasted a glassmaking furnace which stood two stories high. The furnace was invented by Mr. Charles W. Foster, who had 18 years of glassmaking experience at



*(Figure 1.) 1888 photograph of the American Iron Glass Pipe and Plate Company plant in Haverhill, Massachusetts. (Photo is courtesy of the Haverhill, Massachusetts, Public Library)*

other companies in Boston. According to a newspaper article printed on the plant's opening, the organization's furnace was of "the most modern construction, only ten of which are in the United States and Canada". Mr. Foster was also the superintendent of the Iron Glass Works.

The December 19, 1884, issue of *The Haverhill Gazette* wrote, "It is now something more than a week since the first glass was produced at the new works of the American Iron Glass Pipe and Plate Company's Works, and it is now in operation only in the production of a single article, that of telegraph and telephone insulators, for the production of which the company starts out upon a six months contract. When the factory is in full running order its capacity will be equal to the production of 15,000 insulators per day, employing 50 or more workmen."

Later, the Iron Glass Company also produced wicker-covered demijohns at the rate of 500 per day under another large contract. The demijohns were made under several patents in possession of the Iron Glass Company, and "the screw fastening, the bottoming and process of weaving and covering are processes covered by patents held by Mr. Samuel Oakman of Melrose, from whom the right to their use was gained by the company", as the January 30, 1885 issue of *The Haverhill Gazette* attested. The newspaper article further mentioned that Mr. Oakman was present at the glassworks, overseeing and adjusting the demijohn-making machines.

So far, there has been no specific mention in newspaper accounts of Mr. Oakman's involvement with glass insulator production at the Iron Glass Works. However, when the plant opened, he had 15 years' experience in making insulators, so there is little doubt his knowledge about insulator-making was frequently solicited by the Iron Glass Works.

Also in the January 30, 1885 issue of *The Haverhill Gazette* the Iron Glass Company was described as "fast becoming a busy place. They are at present manufacturing three styles of telegraph and telephone insulators... The insulators are produced to fill contracts with several insulator companies who hold valuable patents. The articles turned out are superior in quality, and the quantity produced weekly is very large... There is quite a force of men and boys engaged in making the insulators and bottles, but the full power of the establishment is not yet shown." The news story declined to mention for whom the insulators were being made, nor were there any details about the patents or to whom they were granted.

The company apparently expended substantial effort to produce high-quality glassware by improving and experimenting with glass batch mixtures. On April 6, 1885, *The Haverhill Bulletin* reported, "A test was done this afternoon at the glass works, of the silica that is to be used in the manufacture of iron glass---several of the parties interested were present." A follow-up article in the same newspaper reported that on April 1st the test made "was more satisfactory than any previous, and demonstrated the fact that it can be worked economically and

successfully." The report added, "It was proved that only 18 pounds of soda ash were required to a hundred pounds of silica."

There does seem to be a link between the insulators made at the Iron Glass Works and those mentioned in the *Electrical Review*, on January 17, 1885. In that article about "new" Lewis patent insulators, the writer says, "In Mr. Duxbury's office I met Mr. Lytle, who was down from Boston on business. He tells me that work on the new insulators at Haverhill is progressing favorably; that the tools for making the new English [Lewis] 'screw top' insulators are about ready, and that they expect to turn out a big lot soon." "Corkscrew" (CD 110.5 and 110.6) insulators were already in production when the *Electrical Review* article was written, since it further stated that "Mr. Duxbury tells me that he has tried some of the new insulators of the 'pony' size, and likes them very much indeed."

Since the news events as described in the January 30, 1885 edition of *The Haverhill Gazette*, and the *Electrical Review* article above were occurring simultaneously, and there were no other glassworks in Haverhill at the time of the writing, we conclude that the corkscrew insulators were manufactured by the Iron Glass Works.

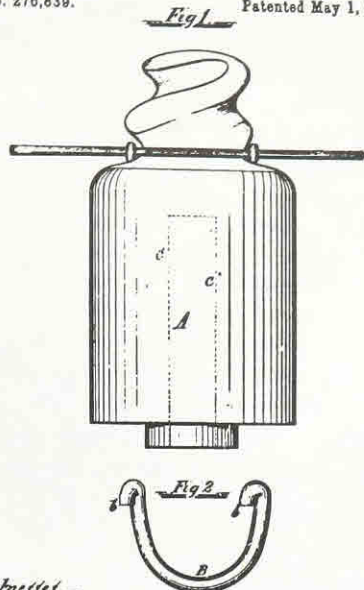
Joseph S. Lewis, an inventor from England, was granted a patent on May 1, 1883, which claimed a design for a conical screw thread on the insulator's crown to accept an improved method of tying the line wire to the insulator. His idea consisted of a horseshoe-shaped metal clip with hooks open on both ends to grasp the line wire.

The rigid metal clip was first attached to the line, and then placed on top of the insulator's threaded crown. As the insulator was turned, its tapering threaded top portion forced the clip downward. This provided additional pressure around the clip to the point where it tightly secured itself and the line wire around the insulator. A conventional wire groove was also provided at the base of the crown's threading so that the lineman could tie the wire to the insulator in the usual manner. This would be particularly advantageous if the insulator's threaded dome was damaged. The extra groove for this purpose does not appear in the text or patent drawing. (Figure 2.)

No reference was made in the Lewis patent about his insulator having interior screw threads so that it could have been fastened onto a corresponding pin. The British insulators with which Mr. Lewis was familiar were threadless and were cemented to a pin.

Approximately six months after the Lewis patent was filed, another patent was issued on December 25, 1883, to Frank L. Pope. (Figure 3.) His idea also concerned an insulator with a spiralling crown. The major difference between the Lewis patent and the Pope patent was that the latter provided specification of an insulator which had a threaded pinhole and the crown's threading spiralled in the opposite direction from the pinhole threads. This feature allowed the line wire with a horseshoe-shaped clip to be secured onto the insulator at the same time

J. S. LEWIS.  
INSULATOR FOR TELEGRAPH WIRES.  
No. 276,839. Patented May 1, 1883.



Witnesses  
Miller & Carl  
Charles A. Tracy

Inventor  
Joseph S. Lewis  
By his Attorney J. H. L. P. A.

(Figure 2.) Joseph S. Lewis patent granted on May 1, 1883. The concept did not specify how the insulator was to be fastened to its pin.

the insulator was turned onto its mounting pin. If the Lewis insulator was to be practically employed for use in the United States, this major improvement would be necessary in order to mount the insulator to a pin.

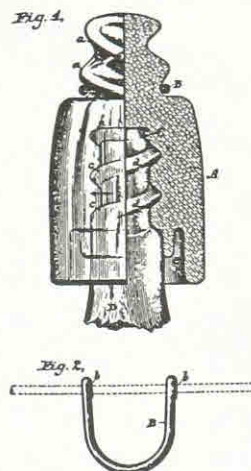
Frank L. Pope was a well-known man in the fields of patent law, electrical engineering, and telegraphy. He began his days in electrical work in 1857 when he was appointed as a telegraph operator for the American Telegraph line. Later, he became a draftsman in the Patent Bureau of the office of *Scientific American*.

He became associated with the telegraph again during 1861. At that time, he was commissioned to make a complete, detailed report of Marshall Lefferts' lines belonging to the American Telegraph Company. These telegraph lines extended from Maine to Virginia, and the research project took him two years to complete.

In later years, Mr. Pope was granted several patents concerning the telegraph and electric railway signal systems. He became associated with printing the weekly trade journal *The Electrical Engineer*, and in 1886 served as the second president of the American Institute of Electrical Engineers (A.I.E.E.). His successful and noteworthy work certainly made him a very influential man and must have given credence to the acceptance of the National "Self-Binding" insulator. It is interesting to note that Pope was Joseph Lewis' patent attorney. Mr. Pope apparently "borrowed" the basic concept of the Lewis patent and subsequently "improved" it!

It is evident that the Iron Glass Company produced the CD 110.5 and 110.6 corkscrew style insulators under

F. L. POPE.  
INSULATOR FOR ELECTRICAL CONDUCTORS.  
No. 290,922. Patented Dec. 25, 1883.



Witnesses  
Wm. A. Smith  
Geo. W. Cook.

Inventor  
Frank L. Pope.  
By his Attorney Pope, Reynolds & Roney.

(Figure 3.) Frank L. Pope patent granted on December 25, 1883. The design allowed the horseshoe-shaped clip to secure the line wire at the same time the insulator was threaded on the pin.

contract for the National Insulator Company. It is entirely possible that they also made the CD 104 and CD 138.2 National styles since they are identical in color, threading and type of embossing to the corkscrew designs. All National insulators are very uniform in color and appearance, indicating they were made at the same plant.

The January 30, 1885 issue of *The Haverhill Gazette* mentioned that the Iron Glass Company was producing "three styles of telephone and telegraph insulators." If this organization started out making its initial contract insulators for only National, then the newspaper's reference to three styles accounts for all known National Insulator company designs: the CD 104, both CD 110.5 and 110.6 corkscrew styles, and the CD 138.2 signal.

Even though the Iron Glass Company attempted to produce economical, high-quality glassware in substantial quantities, all was not so rosy for the business. The organization seems to have been suffering financially from the start.

The May 25, 1885 issue of *The Haverhill Bulletin* reported that "The Haverhill Iron Glass Works were sold at 2 p.m. today to L. V. Spaulding for \$9,600. H. Pearl, Auctioneer."

Further, on August 10, 1885, the newspaper mentioned that, "Attachments were filed Friday upon the estate of the American Iron Glass Pipe and Plate Company" by several parties for a total sum of \$13,000. Mr. L. V. Spaulding, who bought the property in May, was one of the original seven members on the board of directors.

It is entirely possible that glassware continued to



A stock certificate for the American Iron Glass Pipe & Plate Company dated June 27th, 1884.  
 (Courtesy of the Haverhill, Massachusetts, Public Library)

be made at some capacity at the Iron Glass Works after Mr. Spaulding took over, and even for a short period of time after attachments were made to the estate (company officers and board of directors). Further records of activities at the Iron Glass Works are obscure; however, it is known that Mr. Spaulding transferred the property at a later date. The subsequent owner utilized the premises for storage until June 1889, when it was sold again. The Iron Glass Works' facilities were quite modern and well-equipped, but the building was not used again for glassmaking purposes after Mr. Spaulding sold it.

Most of the grounds surrounding the Iron Glass Company's building have been filled in and raised approximately 15 feet above the grade that existed when the plant was producing glassware and insulators. This has made it virtually impossible to locate remains of factory dumpage which would provide evidence of the insulator styles made at the works, as well as for whom the insulators were produced under secured contracts by the Iron Glass Company.

# NATIONAL INSULATOR COMPANY

... and Lawrence B. Gray

This firm was listed in the Boston *City Directory* as the "National Glass Screw Co." in 1885 and in the following year as the "National Insulator Company" with offices at 65 Equitable Building. This organization also had an office at 15 Cortlandt Street, New York City, at least during the year 1886. In charge of production during 1885-1886 was Lawrence B. Gray.

Lawrence B. Gray, who was granted several insulator-related patents during the 1880's, was listed in the Boston *City Directory* beginning in 1885. Mr. Gray's most noteworthy patents were two issued to him on October 7, 1884, which covered "press(es) for making glass insulators." An identically-titled patent was granted to Edward J. Murphy on January 1, 1884, and was assigned to Mr. Gray. The patents involved a threading process, and both patent dates appear on all National Insulator Co. specimens and on no other insulators of any other manufacturer. Mr. Murphy was a moldmaker who resided in Boston during the 1880's. (Figure 1.)

Since we have evidence that at least some, if not all, National insulators were made at the Iron Glass Company works, it appears that Lawrence B. Gray was having insulators made for him there, under patents in his possession.

Considering that all National insulators are base-embossed (a characteristic Samuel Oakman always favored on his insulators), and the fact that Oakman was at least involved with bottlemaking at the Iron Glass Works, it is possible that he may have had some influence during the manufacture of National Insulator Company insulators at the Haverhill works.

Although we have not previously associated Mr. Oakman with the National Insulator Company or Mr. Gray, it seems logical to conclude that the two men shared business and/or production concerns at the Iron Glass Company's plant.

The fact that the American Insulator Company (65 Equitable Building, Boston) and National Insulator Company (26 Equitable Building, Boston) had their offices in the same building during 1885-1886, provides further evidence that there was close association between the two companies. It is therefore very possible that some of the later American Insulator Company insulators were made at the Iron Glass Company's works. Besides occasional inconsistencies in color, American Insulator Co. specimens are very similar to National Insulator Company units. Both manufacturers embossed their insulators with identical small, fine base lettering.

It is interesting to note that during 1885, while Samuel Oakman was associated with the Iron Glass Company, he was listed in Boston at 219 State Street, at a

bottle dealership he operated, and at 2 Wall Street, New York City, which was the New York address of the American Insulator Company. These listings continued for 1886.

It seems indeed probable that some, if not all of the wares he was selling during those two years were produced at the Haverhill works. If research finds that the Iron Glass Company ceased production as early as mid-1885, it would probably be safe to assume that leftover insulators and glassware were being sold by Mr. Gray and Mr. Oakman well into 1886 and even 1887. Remember that the factory was gearing up for producing 15,000 insulators per day, which meant ultimately 2.74 million insulators were made in six months' time, assuming that production was occurring seven days a week. This production estimate alone suggests that more than National Insulator Company specimens were being produced in Haverhill.

Molds for forming bottles and insulators may also have been manufactured at the Iron Glass Works facility, since the company had such an ample glassmaking furnace which could have been used for casting iron molds. Early newspaper articles describe the units produced there as pressed glass instead of blown glass.

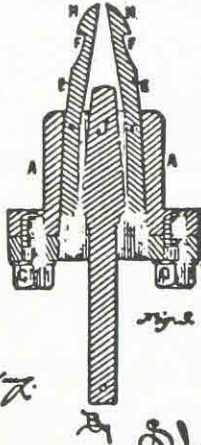
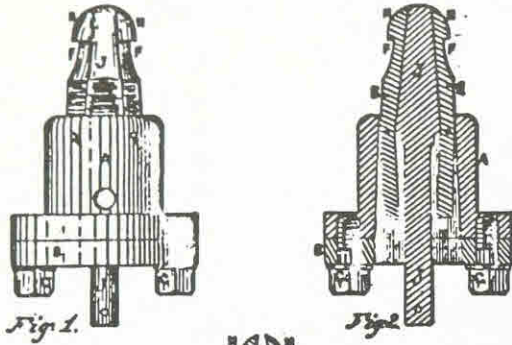
Company officers were: H.M. Chase, president; E.N. Higley, secretary; H.M. Chase, treasurer and a board of seven directors.

Three styles of insulators were manufactured for the National Insulator Company. There were two corkscrew styles, the CD 104 pony and the CD 138.2 signal. Of the two corkscrew styles, the CD 110.5 is smaller and more common and has been located throughout the northeastern United States and portions of Canada. All are either aqua or a distinctive light green which is quite rare.

All CD 110.5 Nationals are lettered around their base rims (Figure 2.) Some have the word "INSULATOR" spelled out, and on others it is abbreviated as "INSUL." At least one example is known which has a distinctly flat base rim (with the usual embossing). It is radically different from the rounded bases normally found on all other specimens. The flatness of this CD 110.5 is like the base found on CD 110.6 Nationals. In addition, some CD 110.5 Nationals have two-segment threading which was covered by one of Mr. Gray's October 7, 1884 patents.

A small number of CD 110.5 units were produced on special order for the New England Telephone & Telegraph Co. with their name also appearing on the insulators. It is probable that the earliest units bear the straight lettering (Figure 3.), while later specimens are embossed in an arc. (Figure 4.) The straight-lettered examples are more scarce and the skirt embossing is usually quite weak, crooked and difficult to read. This variant is sometimes located with two-segment threading.

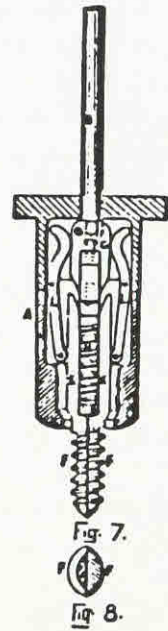
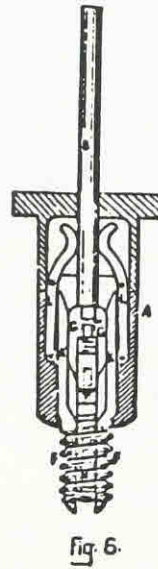
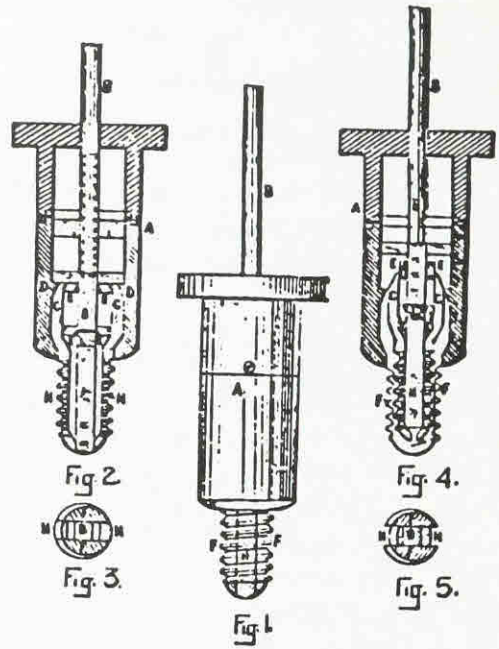
**B. J. MURPHY.**  
**PRESS FOR MOLDING GLASS INSULATORS.**  
 No. 291,072. Patented Jan. 1, 1884.



Witnesses:  
*C. S. Gooding*  
*Edwin Edmunds*

Inventor:  
*Edmund J. Murphy*  
 By *Sylvanus Walker*  
 ATTORNEY.

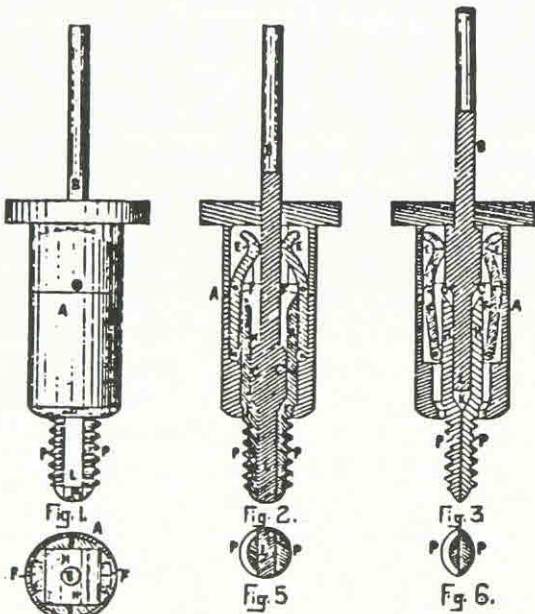
**L. B. GRAY & J. HAM.**  
**PRESS FOR MOLDING GLASS INSULATORS.**  
 No. 306,147. Patented Oct. 7, 1884.



WITNESSES:  
*C. S. Gooding*  
*W. R. Marble*

INVENTORS:  
*Lawrence B. Gray*  
*Joseph Ham*  
 By *Sylvanus Walker*  
 Attorney.

**L. B. GRAY.**  
**PRESS FOR MOLDING GLASS INSULATORS.**  
 No. 306,146. Patented Oct. 7, 1884.



WITNESSES:  
*Chas. S. Gooding*  
*W. R. Marble*

INVENTOR:  
*Lawrence B. Gray*  
 By *Sylvanus Walker*  
 Attorney.

(Figure 1.) First of two patents issued October 7, 1884, to Lawrence B. Gray and ...

...the second issued jointly to Lawrence B. Gray and J. Ham.

(Figure 2.) Base embossing on CD 110.5 Nationals



All corkscrew insulators located bear National Insulator Co. lettering. There is evidence that the Brookfield Glass Company also offered either or both styles. However, none have been located which appear to be of Brookfield manufacture. Perhaps Mr. Gray allowed Brookfield the patent rights to make these after the Iron Glass Company closed their doors. (Figure 6. - see following page)

Another National Insulator Company insulator is the CD 104. These were designed for subscriber open wire telephone use. The "NEW ENG. TEL & TEL CO." embossing on the skirt always appears in an arc. (These are not to be confused with CD 104 units manufactured for New Eng. Tel. & Tel Co. which also have arc embossing on the skirt but no embossing on the base rim). Most are aqua, although a few have been observed in light green glass. The base rim lettering is much smaller and finer than that found on the corkscrew styles. (Figure 7.) All CD 104 Nationals have full pinhole threading.

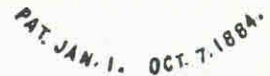
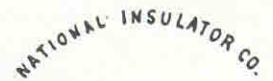
(Figure 3.) NEW ENG. TEL. & TEL. CO. in the straight-across lettering.



(Figure 4.) NEW ENG. TEL. & TEL. CO. in an arc embossing.



(Figure 7.) Base embossing on CD 104 Nationals



All "New Eng. Tel. & Tel. Co." -lettered Nationals are scarce. Many of the units have a slug plate marking on the rear skirt which suggests that embossing was once used within the molds, or at least planned in that location.

The last insulator style manufactured for National was the CD 138.2 signal, designed for low voltage distribution and fire alarm telegraph work. These specimens seem to have been widely scattered throughout the New England states.

All insulators of this style are aqua and have fine, concise lettering like the CD 104 Nationals. An interesting characteristic of these specimens is the minor chipping or small bruises around the base of their pinholes. This was probably caused during annealing of the glass after the threading mandrel was removed from the insulator or by friction between the glass and the mounting pin.

Possibly related to Lawrence B. Gray's insulator production at National are a very few CD 188 "Brown's pony" or "duplex pin" insulators of unknown origin which have two-segment threading. These are of aqua glass and are lettered: "PAT'D NOV 23<sup>d</sup>, 1886." This patent was granted to Robert G. Brown (assignor to E.S. Greeley & Co.) for this "through-pinhole" design.

The large corkscrew (CD 110.6) is not as common as its CD 110.5 counterpart. With the exception of one unit dug in New Jersey, all CD 110.6 Nationals the author is aware of were located on a fire alarm system in New Hampshire some years ago. The embossing is boldly lettered on the base rim, and none of these units has been located with the additional "NEW ENG. TEL. & TEL. CO." skirt embossing. All known examples have full pinhole threading. (Figure 5.)

(Figure 5.) Base embossing on CD 110.6 Nationals



THE  
NATIONAL SELF BINDING  
**INSULATOR,**  
—FOR—  
Telegraph, Telephone and Electric Light Wires  
AND ALL ELECTRIC CONDUCTORS.  
WITH DIRECTIONS FOR USE.  
Information can be obtained and Orders given through the  
**NATIONAL INSULATOR COMPANY,**  
65 Equitable Building, Boston, Mass.,  
AND 15 CORTLAND ST., NEW YORK.  
—OR—  
**WILLIAM BROOKFIELD, SOLE MANUFACTURER,**  
46 CLIFF ST., NEW YORK.  
JOSEF POLSMEIER, PRINTER, 108 NASSAU ST., NEW YORK.

DESCRIPTION

OF THE  
NATIONAL SELF BINDING INSULATOR.

This insulator dispenses entirely with the old and troublesome tie-wire, being so constructed that the line-wire is applied and secured without the use of any tools whatever, and in the shortest possible time. It can be used in any situation, whether on curves, against walls, under bridges, on roofs, or wherever a tie-wire can be used. It is remarkably simple, durable and efficient, cannot get out of order, and may be removed or renewed with the greatest facility.

It is constructed with a conical and expanding screw-thread upon the exterior of the upper portion, similar in form and principle to the point of a gimlet. The line-wire is attached by means of a rigid wire shackle or clip, formed in the shape of a horseshoe, the curved portion of which is adapted to encircle the body of the insulator at the base of the conical screw portion, while each end of the clip is made into a hook adapted to grasp the line-wire. The bell of the insulator below the point of support of the line is given the form shown by experience to be the best.

The following figures 1 and 2 show the position of the clip and line-wire when applied to the insulator.

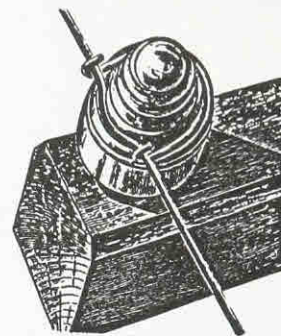


Fig. 1.

The attachment is made by first screwing the insulator a short distance on the pin, then inserting the conical screw top into the clip, which latter has previously been hooked at the proper point over the main line, the manner of doing which is shown in figure 3; then, as the outside and inside screws are in contrary directions, two or more turns given the insulator carries it down to its

\* For full directions, see page 7.

bearing on the pin, and also brings the clip to its place at the foot of the screw on the outside of



Fig. 2.

the insulator. Nothing can exceed the neatness and security of the attachment, while a little practice enables the lineman to do the work with great rapidity.

Besides the peculiar form of attachment for the wire, the National Insulator is provided with a far better and more perfect internal screw than any other insulator. It is formed by newly invented molding tools of peculiar form; the greater sharpness and accuracy of the thread gives a better hold to the pin, and facilitates the operation of securing the insulator both to the main line and to the support.

This insulator is the invention of J. Slater Lewis, Esq., of Birkenhead, England. It has been used in Europe for some time, and is

universally pronounced to be the only one that is fully adapted to the varied wants of the telegraph engineer. The principal English railways and telephone companies have adopted it, and the British post-office telegraph, after rigid tests, have decided to adopt it exclusively in their future work.

It is approved by every line builder who has seen it, and it becomes the favorite of every one the moment it is used.

The advantages over any other insulator are distinctly claimed to be the following:

1. *Saving in Time in Building New Lines.* After a little practice it will be found that linemen can build one-quarter more line in a given time when this insulator is used, than with the ordinary kind. No coil of tie-wire and no tools encumber the workman and occupy his time; the clips can be carried in his pocket, and when ready, one can be taken and the attachment made with great rapidity.

2. *Saving in Time in Renewing Line Wire.* Even if there were no special saving in time by its use in erecting new wires, yet the great advantage gained in renewing and changing existing wires and poles, must lead to the universal adoption of this insulator. In renewing broken insulators, in changing poles, &c., tools of any kind are entirely unnecessary. The old insulator can be removed in an instant, the new one screwed into the place, without disturbing the tie, whether it be an ordinary tie-wire or a clip. In rebuilding lines, if this insulator has been used, the time that can be saved is very important. There are no old tie-wires to be

removed and thrown away, no new tie-wire to be provided; the same clips are used in rebuilding, and the line when rebuilt is in every respect as good as before, though every attachment is in a new place. The facility with which a line can be taken down and rebuilt, when these insulators are used, is surprising.

3. *Saving of Cost in Tie-wires.*—The clip can be used any number of times, whereas the ordinary tie-wire can be used but once, except as already stated, under this system, where such tie-wire, remaining attached to the line after the insulator is removed, is again available for use.

4. *Greater Durability of Line-wire.*—As no tools are used in attaching the insulator, the line-wire is never nicked nor in the least injured. This is a very important point. Experience has shown that the use of pliers in attaching the tie-wire to the line inevitably nicks and cuts the outer coating of the wire. Rust, weakness and ultimate breakage follow.

5. *Improved Insulation,* as the use of the clip leaves fewer crevices to hold dust and the whole attachment is more open to the cleansing action of the rain.

6. *The wire can be held with any degree of tightness or slackness* by adapting the length of the clip to the desired result.

7. *The old Tie-wire Fastening* and any desired method of forming the tie, can be used with this insulator in the same manner as with the ordinary pattern, whenever desired. When so used, the insulator is equal in every respect to the best of the ordinary forms, with the additional advantage that

DIRECTIONS FOR USING THE INSULATOR.

The insulator having been screwed on the bracket or pin, give it three complete turns backwards after it has come to its bearing, and hook the clip on the line wire with the ends of the hooks turned upwards, as shown in Figure 3, then drop the clip and line-wire over the top of the insulator as shown in the same figure, after which the insulator must be screwed down on the pin as



Fig. 4.

shown in Figure 4. Care must be taken to see that the clip goes down the thread of the screw first with the line-wire following it, the screwing motion being continued until the insulator comes to its bearing on the pin or bracket, when the attachment will be complete.

It will be seen that the insulator is secured to the pin or bracket, as well as to the line-wire, by a single operation.

In detaching the line-wire this process is exactly reversed, the insulator is turned the other way, the

line-wire going up by the groove first and the clip following.

Some linemen prefer to carry a pocket oil can, and before screwing on the clip they apply a single drop to the point on the clip, and also on the line-wire which rubs against the insulator; friction is thereby avoided and the work made easier.

To replace a broken or damaged insulator of the common kind it must be smashed and the pieces taken out, leaving the tie-wire attached to the line



Fig. 5.

as shown in Figure 5. The new insulator is then screwed on the pin or bracket as before, and the loop placed over the top of it, after which the operation is precisely the same as illustrated in Figures 3 and 4.

After a little practice the attachment may be made with great rapidity.

The *National Insulator* as described in this pamphlet, the device for attaching it to the wire, and the tools for its manufacture are covered by United States and Canada patents, which are owned and controlled by the National Insulator Company, 65 Equitable Building, Boston, Mass.

For information, samples, prices, etc., address

**NATIONAL INSULATOR COMPANY,**  
65 Equitable Building, Boston, Mass.,  
And 15 Cortlandt street, New York.

Or **WILLIAM BROOKFIELD,**  
Sole Manufacturer, 46 Cliff street, New York.

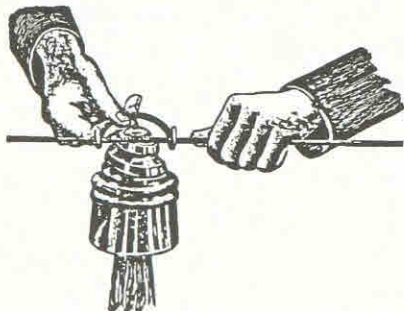


Fig. 3.

removed, a clip can be substituted, together with the new insulator, and even then time is saved, and the line so far improved.

(Figure 6.) A terrific nine-page pamphlet illustrating the National Self Binding Insulator as advertised by the Brookfield Glass Company. (Courtesy of David Dale)



# THE STANDARD GLASS INSULATOR COMPANY

... and Lawrence B. Gray

Lawrence B. Gray was listed as a moldmaker in Boston *City Directory* listings during the 1880's, and was granted two patents on October 7, 1884, (the latter patent was issued jointly to Joseph Ham) for "presses for molding glass insulators." These patents were used in the production of National Glass Insulator Company insulators most likely by the American Iron Glass Pipe and Plate Company works at Haverhill, Massachusetts. It is entirely possible the Haverhill plant also produced units with only the "MANUFACTURED BY LAWRENCE B. GRAY'S PATENT PROCESS" embossing. However, the unusual color, an odd bluish lavender, in which these insulators were manufactured does not compare with the uniformity of light aqua or light greenish glass in which National specimens are known. The shape of the CD 138.2 Lawrence B. Gray is similar to the style produced by The Standard Glass Insulator Co., with large base lettering like the Standard units. (Figure 1.) The Standard Glass Insulator Company advertised their insulators as being "Manufactured By Lawrence B. Gray's Patent Process", (Figure 2.) so there could have been an association between insulators made by Standard (location of glassworks unknown) and the scarce units lettered with the Lawrence B. Gray Patent Process reference. Mr. Gray may have desired to try his own hand at making his own insulators at some other location. Only two or three units have been found, one in a Boston suburb in 1975.

The Standard Glass Insulator Company was listed in the Boston *City Directory* during 1893 and 1894. The company's office address was the Philips Building, 120 Tremont Street, Boston. The location of their glass factory and who made insulators for Standard still remains a mystery. It is evident that Mr. Lawrence B. Gray, who was in charge of the National Insulator Company during 1885-1886, oversaw much of the business operations at Standard. We find that Mr. Gray was listed in the 1893-1894 Boston city directories at Standard's office address.

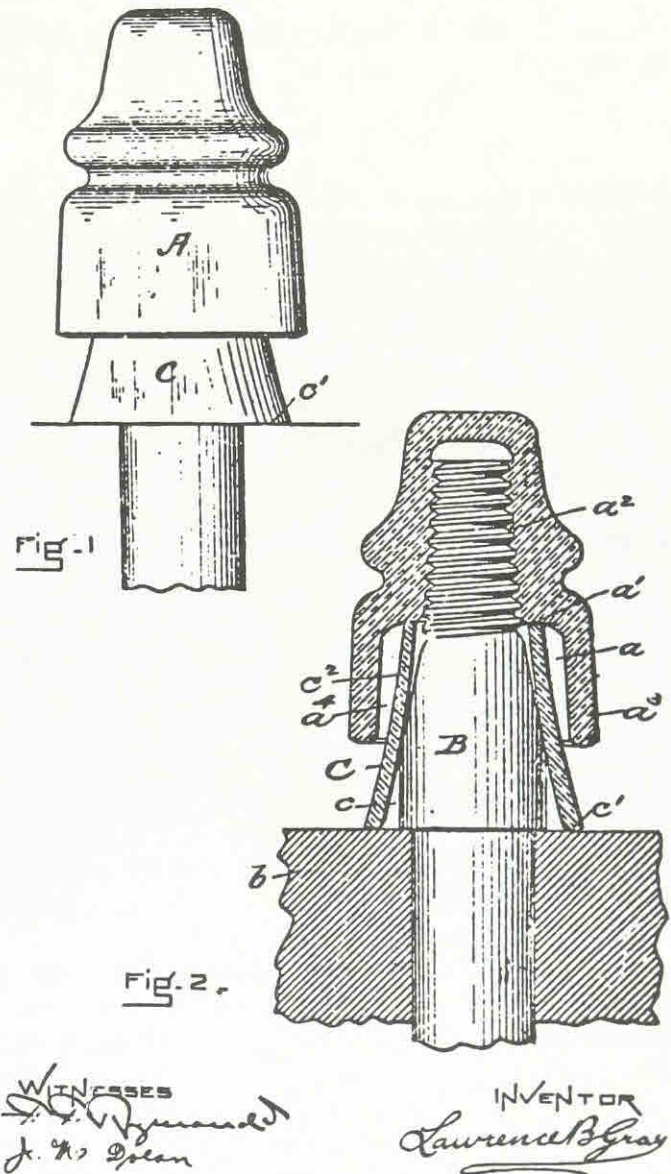
Mr. Gray was granted and assigned several patents which concerned the manufacture of glass insulators during the 1880's, some of which were utilized in producing National Insulator Company specimens.

All Standard insulators are uncommon to rare, depending on the style. At present, seven Standard designs are known. Four styles (CD 104, CD 121, CD 138.2, and CD 145) were commonly used during the 1890's for telephone, telegraph, and low voltage electric distribution work. The other three designs are unique to

L. B. GRAY.  
INSULATOR.

No. 514,221.

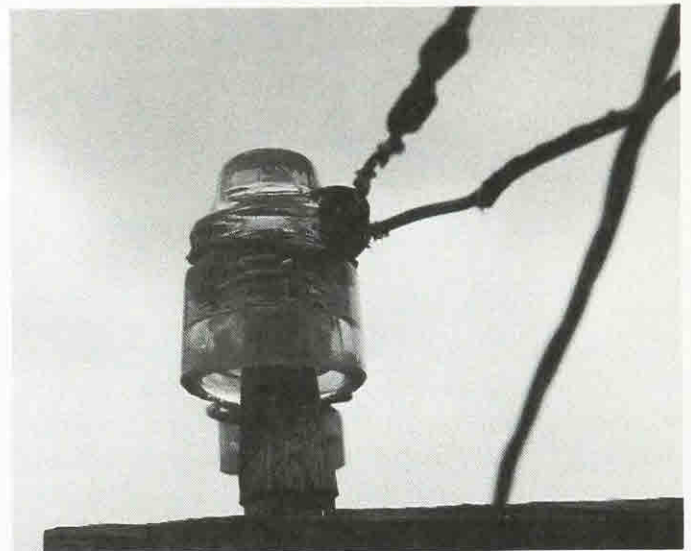
Patented Feb. 6, 1894.



(Figure 1.) Another one of Mr. Lawrence B. Gray's patents granted on February 6, 1894. Note the pin shroud at the insulator's base which is similar to that used with porcelain insulators in later years. This concept is also similar to that used with two-piece "Muncie" insulators manufactured by Hemingray. The insulator in the illustration is identical to the CD 138.2, but there are no "supporting" insulators known like the one shown made under the Gray patent.



(Figure 2.) 1893 Boston City Directory listing for The Standard Glass Insulator Co.



(Figure 3.) Photo of CD 157.5 Standard signal in service. (Photograph courtesy of cable-splicer Bob Fuqua.)

Standard's manufacture, namely the CD 114.2, 157.5 and 268.5. Standard's insulators, like most fully-threaded Nationals, also have a pair of faint but visible lines extending from the base to the top of their pinholes, with a rectangular formation appearing at the pinhole's top. These characteristics are the result of Edward J. Murphy's and Lawrence B. Gray's collapsible threading plunger process patented January 1, 1884.

Most common is the CD 157.5 signal style, followed by the CD 138.2. A number of both designs have been located in the Boston metropolitan area, and probably were a fairly common sight in their day in surrounding communities. Although practically all Standard insulators have been removed from service, a lone survivor was observed on an old fire alarm line in 1989. (Figure 3.)

All Standard glass insulators are embossed identically with the exception of CD 268.5 which is lettered "PATENT/AUG. 8, 1893" on its skirt, in addition to the usual embossing around the base. The 1893 design patent concerned a shape of the insulator's wire groove and cable groove so as to be "pleasing to the eye" and was granted to Lawrence B. Gray.

It is interesting to note that the CD 268.5 design is not embossed with Samuel Oakman's June 17, 1890 saddle groove patent date. This is unusual because other cable styles produced by Brookfield, Hemingray, Knowles, and other manufacturers during the life of Mr. Oakman's patent, bear the 1890 date on their insulators.

Even though Standard insulators are lettered around the base, as Mr. Oakman always favored on his units, we have no evidence that he was connected with their manufacture.

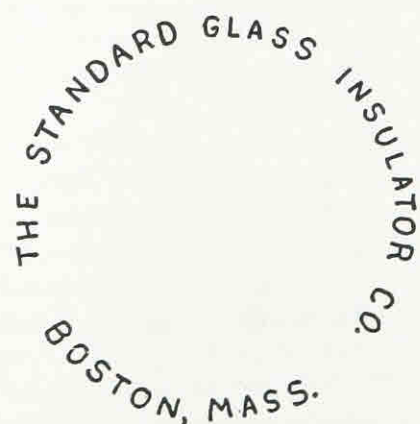
Since it was Lawrence B. Gray who was listed at The Standard Glass Insulator Co. address at 120 Tremont Street during Standard's existence, it was he who had significant influence over insulator production for the company.

PETTINGELL-ANDREWS COMPANY  
BRODIE TREE INSULATORS.

Code Word	List No.	Form	List Price, Each
Source	292	Form S. P. for No. 2 and smaller	\$0.50
Made	293	Form C. P. for No. 2 and smaller	.50
Compass	294	Form 3 S. P. for No. 2 and smaller	.70
Future	295	Form 3 C. P. for No. 2 and smaller	.70
Lalors	296	Form 2 S. P. for 4/0 and smaller	.90
Zicoh	297	Form 2 C. P. for 4/0 and smaller	.90
Officer	298	Form 4 S. P. for 100,000 C. M.	1.20
Risk	299	Form 4 C. P. for 500,000 C. M.	1.20

Sizes of wire given are triple braid weatherproof.  
Form S. P. has drive lag and pulley.  
Form C. P. has cleat base and pulley.  
Forms 2, 3 and 4 have double petticoat insulation.

(Figure 4.) Possible design use of Standard double groove pony insulators as depicted in this Pettingell Andrews Company catalog cut of the 1890's.



Base embossing found on Standard insulators.

## The Final Chapter . . .

# NEW ENGLAND GLASS MANUFACTURING COMPANY

The New England Glass Manufacturing Company was listed for only one year, 1899, in the *Boston City Directory*. It was the last glassworks in the Boston area to produce insulators. Their office address was 64 Federal Building, Boston, but the location of their manufacturing facility is unknown.

So far, eight styles have been attributed to the New England Glass Manufacturing Company. For a company which apparently was in existence for only one year, it produced many insulators which were distributed widely around the country.

N.E.G.M.CO. produced insulators which were commonly used styles at the turn of the century for telephone, telegraph and low voltage distribution work. The most frequently found styles are CD's 102, 145, 162, 251 and 294. Their embossing is uniformly "N.E.G.M.CO.". (Figure 1.)

Three additional cable styles, CD 250, 267 and 267.5, are less common. The CD 250 is essentially the same design as the more common CD 251, except that the former has no inner skirt and appears stretched out in height. This style is quite rare.

CD 267 and 267.5 were designed for supporting heavy direct current trolley feeder cables. The CD 267.5 is an unusual style and is identical to the CD 267 except that it has no side groove. Like the CD 250, the CD 267.5 is a design unique to the New England Glass Manufacturing Company.

To the author's knowledge, all CD 267.5 specimens were used on an eight-mile section of elevated trolley line built about the turn of the century in Boston. The feeder cables used were usually 1 1/4 inches in diameter and larger. The insulators were mounted on cross timbers beneath the railway catwalk, with the heavy cables draped through the insulators at approximately 12-foot intervals. It is entirely possible these insulators were specially-made for use on that line because of their unusual style and the fact that none have been located elsewhere. During 1987 and 1988 this trolley line was discontinued and dismantled, so all CD 267.5 specimens presently in existence are probably in collectors' hands.

It is interesting to note that Jack Tod illustrates an identical porcelain style to the CD 267.5 in his *Universal Style Chart*. (See Reference Books Bibliography) This design was illustrated in the 1908 Pittsburgh High Voltage Insulator Company catalog, but so far no porcelain examples have been located.

N.E.G.M. CO. insulators are boldly lettered on

their skirts with the company's initials. (Figure 1.) The cable styles, except for the CD 267.5, also include the embossing "PATENTED JUNE 17, 1890". This represents Samuel Oakman's patent for the insulator's saddle groove top.



(Figure 1.) Skirt lettering typically found on N.E.G.M.CO. insulators.

The majority of N.E.G.M. CO. insulators are aqua, ranging from lighter shades to deep bluish green. Some are green and range from a light lettuce green through medium and emerald green to a deep olive green. The richer and darker greens are the result of using scrap glass (cullet) with the glass batch. In addition, a few N.E.G.M. CO. specimens, particularly the CD 145 and CD 162, have been noted in an attractive medium sapphire blue color which is similar but somewhat darker than a cornflower blue.

Joe Maurath, Jr. was contributing "Insulator Bylines" editor for *Old Bottle Magazine* from July 1974 - May 1981. Joe is a lifelong resident of suburban Boston and a 1974 graduate of Bentley College in Waltham, Massachusetts, with a Bachelor's Degree in General Business. Since January 1981, Joe has been employed by a municipal electric utility in his area, and is responsible for the system's metering and energy conservation programs he developed for the utility's customers. His collecting began in 1967, and his interest in insulators and the electric utility field is reflected in the "go-withs" associated with these interests which are on display at his home for all visitors to enjoy. "Researching has also been a big part of my collecting experience, since I find it exciting to uncover some information previously unknown, no matter how big or small the discovery might be." Joe credits his tremendous research contributions to this book to: "Bob Fuqua, a close and dedicated collector friend, who researched the American Iron Glass Pipe and Plate Company. His findings resulted in the inclusion of this company's historical facts and accounts. Bob also provided close-up photographs of insulators in service; Ray Klingensmith, Elton Gish, Kevin Lawless and Bill Snell, whose published research on Boston area glass-makers and their insulators was invaluable; Danny May, Tom Moulton, Richard Gay, Win Trueblood, and the staff of the Haverhill Public Library for their encouragement and assistance."