Canadian Railway Communications Insulators 1880 - 1920

By Mark Lauckner

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Introduction

In archaeology and the study of historical artifacts there is little or no public access to specimens in private collections. As most of the specimens listed in this book are in private collections, one function of this document is to provide public access to this valuable information as historical reference material.

This document contains an inventory and study of known Canadian railway "beehive" insulators. It was prepared in appreciation of the incredible variety of these artifacts, as well as their historical significance.

CNR looking East, Saskatoon, Saskatchewan.

Canadian railways have now installed microwave and radio equipment for train dispatching, and use satellite links and optical fiber for communications. Open-wire telegraph lines have now almost completely faded from the Canadian landscape. With communications progress, an important piece of history is also fading away. Many of these original insulators, with their history and beauty, represent an important era in the development of a technology we now take for granted. As historical artifacts, these insulators represent the brave and awkward beginnings of a communications technology that helped shape the development of the nation.

With the glory and hardship attributed to the development of Canadian railways, the telegraph which played a vital role, has not received the recognition

it deserves. The important role of railway communications for telegraph and train dispatching hasn't been given much acknowledgment in the well-documented history of Canadian railways.

CPR at Field, B.C.
Microwave communications
have replaced open-wire telegraph lines.

Insulators are culturally and historically significant to specific areas and uses around the country. That tangled mess of open-wire pole line was woven into almost every aspect of Canadian culture. The livelihood of countless thousands of line workers and telegraphers and their families are very much a part of this culture. Open-wire pole lines appear in most historical photographs of Canadian cities, prairie towns, and railway life. These functional pieces of antique electrical apparatus are very special, and are part of our dwindling Canadian heritage.

This book is intended not only as a reference tool for historians, collectors and researchers, but as a means to further popularize the concept that these insulators are historical artifacts. As historical artifacts, insulators represent the birth of a communications technology that helped shape the growth of the nation. Through a growing appreciation for these open-wire communications insulators, perhaps we can preserve a little more of our Canadian railway heritage.

Update Subscription Service

Historical research and archaeology are ongoing and are intended to produce information and specimens not previously documented. Reference books documenting information of this nature are often only current for a short time after publication. An effort was made to produce the first version of this book as completely as possible. However, additional specimens are expected to come to my attention soon after the initial circulation.

An update subscription service will be provided for individuals and organizations that wish to be notified of new information. These updates will be in the form of single pages, and are intended to be included with, or to replace existing pages. They will be available semi-annually. Books distributed will contain all previous updates.

Individuals with information or specimens not included in this document are requested to notify me. Contributors will be acknowledged and will receive complimentary updates. An update subscription request form is included near the end of the book.

A Brief History of Canadian Railway Communications

"One of the most useful applications of the electric telegraph is in connection with our railroads. No railroad should be without a telegraph line, so that the precise situation of every train on the road is known at the superintendent's office, and at all the depots on the line." [1]

George Prescott 1860

Prior to the development of the telegraph, train movements were controlled by unreliable means. Locomotives were signalled with flags, hand motions, and a ball on a pole (hence the term 'high-ball').[2]

Commercial telegraph began in Canada in 1847 with the formation of the Montreal Telegraph Company. The concept of a railway telegraph system was suggested as early as 1830, but it was not until 1852 that such an idea was realized in Canada. It was then that the Grand Trunk Railway was given the authority to build a telegraph line along their Montreal to Toronto right-of-way. Four years later, by 1856, telegraph was being used on the Grand Trunk Railway on a small scale. The Grand Trunk was interested in building a railway and telegraph line through the vast Hudson's Bay Company's Rupert's Land to the Pacific Ocean in the early 1860s. The land was purchased from the Hudson's Bay Company for £1,500,000 on June 15, 1863[3], but the plan failed due to troubles within the Grand Trunk Railway.[4]

Another example of a proposed railway telegraph occurred in 1858 as the North-West Transportation, Navigation and Railway Company was incorporated with "powers to establish communication from one or more points on the shore of Lake Superior to any point in the interior within the limits of Canada".[5] One year later their name was changed to the North-West Company, and the act was amended with the addition of "to construct a telegraph line". The act expired and the line was not built.[6]

As many more trains were running in Canada in the 1880s than in the 1860s, it became increasingly difficult to operate railways safely and efficiently. Telegraph communication between trains and railway safety operations became vital.

In the early 1880s, a commercial telegraph company approached the Canadian Pacific Railway (CPR) and tried to secure rights to erect a telegraph line along the CPR right-of-way. The CPR thought that the offer was not high enough, and Van Horne stated that, "As the CPR was putting up its own lines and enjoying it own operations as an adjunct to train operations, it should rightfully operate its own commercial service". As a result, the CPR began transmitting commercial telegraph messages in 1883.[7]

In 1882 the CPR had 181 miles of single-wire telegraph line and 714 miles of two-wire line in use.[8] In 1885 the CPR telegraph had made a profit of $145,000 mainly due to newspaper correspondents covering the (Louis Riel) North West Rebellion. During this time special telegraph lines were dedicated for military use. (This resulted in one telegrapher being killed and another held prisoner until after the Rebellion.)[9]

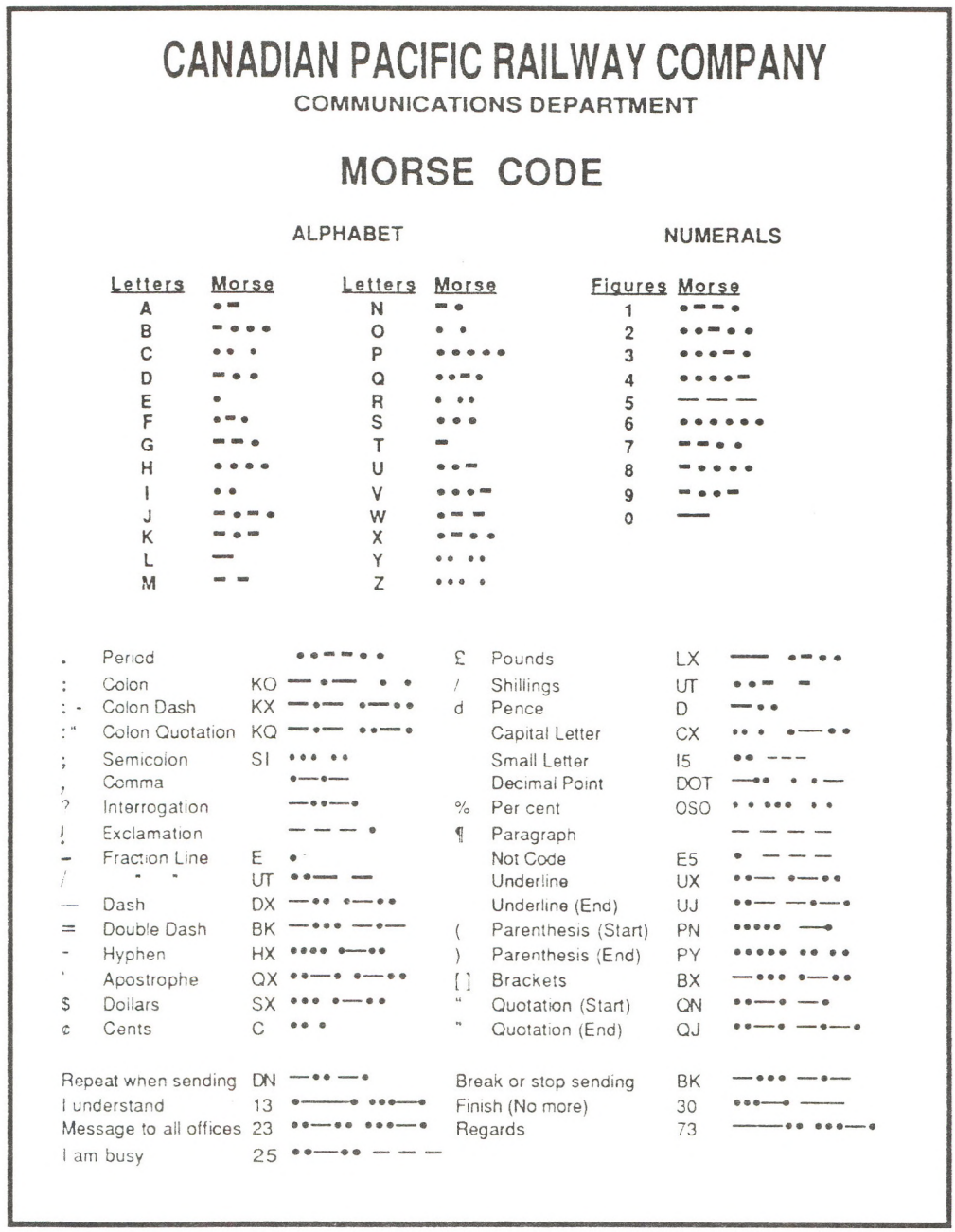
Canadian Pacific's telegraph service expanded rapidly, with lines being installed along the right-of-ways of the Ontario and Quebec Railway. This linked Montreal with Smith Falls, Peterborough and Toronto.[10] By 1886 the CPR telegraph system surpassed that of the Grand Trunk Railway.

One ongoing problem with operating train movements by telegraph was that some railways insisted on their own transmitting code. It wasn't until around 1890 that a standard form of Morse code for train dispatching was established in Canada.[11]

Stations were clearly distinguished by whether or not they had a telegraph. The role of the railway station and telegraph office became a vital one, especially in small communities. It was customary for the townspeople to gather about the telegraph office to secure any news coming over the wire.[12] For this reason, the railway station played an unofficial role as an information centre, in addition to its normal function.

Pole line construction was, of course, essential for telegraph operation. George Prescott, the leading telegraph engineer of the time, reported, "The lines were usually built in haste, the posts generally set while filled with sap, often without taking off the bark. As a consequence, in a few years they rotted off at

the surface of the earth and then had to be replaced by others in the same manner.[13] This method of pole construction went on for 15 to 20 years. After this, dried poles were used, coated in paint, creosote, fat or oil. Poles were placed about 13 feet from the trackside, with crossarms no closer than 8 feet from the track. Pole tops were either 'roofed' or 'gained'.[14] The poles were set from 88 to 150 feet apart, or 60 to 26 per mile. The average was 100 feet apart, with 53 to the mile."



CANADIAN PACIFIC RAILWAY COMPANY

COMMUNICATIONS DEPARTMENT

MORSE CODE

ALPHABET

Letters	Morse	Letters	Morse
A	•−	N	−•
B	−•••	O	• •
C	•• •	P	••••••
D	−••	Q	••−•
E	•	R	• ••
F	••−•	S	•••
G	−−•	T	−
H	••••	U	••−
I	••	V	•••−
J	−•−•	W	•−−
K	−•−	X	•−••
L	—	Y	•• ••
M	−−	Z	••• •

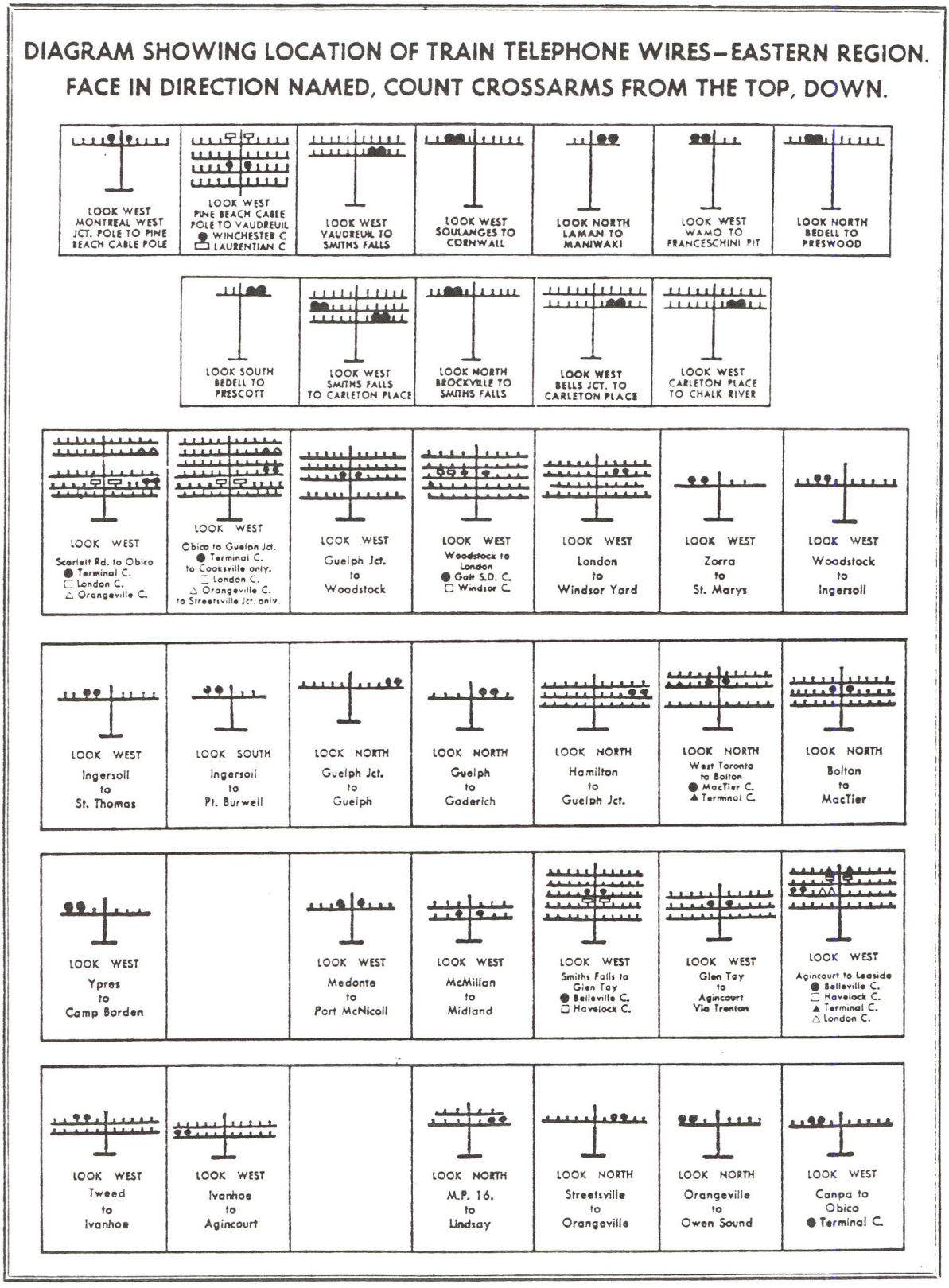
NUMERALS

Figures	Morse
1	•−−•
2	••−••
3	•••−•
4	••••−
5	— — —
6	••••••
7	−−••
8	−••••
9	−••−
0	—

.	Period		•••−••	£	Pounds	LX	— •−••
:	Colon	KO	— •— • •	/	Shillings	UT	•••− −
: -	Colon Dash	KX	—•— •—••	d	Pence	D	—••
:"	Colon Quotation	KQ	—•— ••—•		Capital Letter	CX	•• • •—••
;	Semicolon	SI	••• ••		Small Letter	I5	•• –––
,	Comma		•—•—		Decimal Point	DOT	—•• • •—
?	Interrogation		—••—•	%	Per cent	OSO	• • ••• ••
!	Exclamation		— — — •	¶	Paragraph		— — — —
-	Fraction Line	E	•		Not Code	E5	• — — —
/		UT	••—• —		Underline	UX	••— •—••
—	Dash	DX	—•• •—••		Underline (End)	UJ	••— —•—•
=	Double Dash	BK	—••• —•—	(	Parenthesis (Start)	PN	••••• —•
-	Hyphen	HX	•••• •—••	)	Parenthesis (End)	PY	••••• •• ••
'	Apostrophe	QX	••—• •—••	[ ]	Brackets	BX	—••• •—••
$	Dollars	SX	••• •—••	"	Quotation (Start)	QN	••—• —•
¢	Cents	C	•• •	"	Quotation (End)	QJ	••—• —•—•

Repeat when sending	DN	—•• —•	Break or stop sending	BK	—••• —•—
I understand	13	•———• •••—•	Finish (No more)	30	•••—• ———
Message to all offices	23	••—•• •••—•	Regards	73	———•• •••—•
I am busy	25	••—•• — — —			

Railway Morse Code became standardized in 1890.

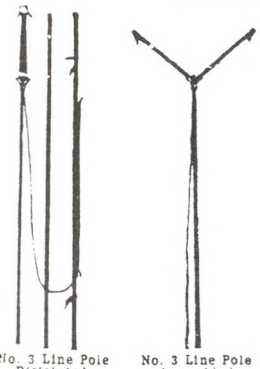


The dots at certain insulator positions on the cross-arms indicate the train dispatcher's lines on the poles on different railway main lines and branch lines. (Chart from a CP RAIL Employee Timetable, 1969.)

THE Northern Electric AND MANUFACTURING CO. LIMITED

TELEPHONE EQUIPMENT

FOR STEAM AND ELECTRIC RAILWAYS



No. 3 Line Pole Disjointed — No. 3 Line Pole Assembled

LINE POLES

Made of hickory and are adapted for use in connection with metallic circuits; the spreaders are of sufficient length to engage wires spaced a distance of 2 feet apart. Connectors are provided with a cleaning device. Equipped with 100 feet of 2 conductor cord.

Used with Nos. 1330-E, 1331-E, 1332-E, N3-A, and 1332-E portable telephones.

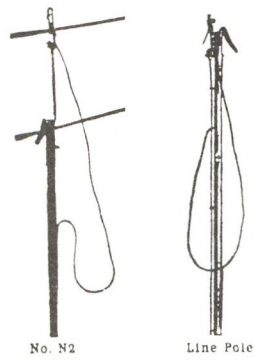
Trade No.	Mfrs. No.	Price Each
089495	3	$7.84

No. 4 Line Pole

Similar to No. 3, but arranged for connecting the portable telephone to the line wire of a grounded circuit. Equipped with 10 feet of single-conductor cord.

Used with No. 1314-A portable telephone.

Trade No.	Mfrs. No.	Price Each
089496	4	$7.23



No. N2 — Line Pole

RICHARDSON LINE POLES

Arranged for use in connection with metallic circuits. Can be connected to line wires in either horizontal or vertical planes which are spaced any distance up to 5½ feet. The adjustment of one-wire clamp is controlled by a cord. The length of the cord connecting the line to the telephone set is 100 feet.

Used with Nos. 1330-E, 1331-E, 1332-A, 1332-E and N3-A portable telephones.

Trade No.	Mfrs. No.	Price Each
089497	N2	$8.78

A Bell Canada catalog (1913) depicting different styles of line poles.

The first circuit on the crossarm was always the dispatcher's circuit. It was followed by a station-to-station circuit used for station calls and local business. A main railway line may have had 5 to 7 crossarms, while branch lines and short lines would have used fewer. A telegraph set was used by trains on sidings waiting for instructions to proceed. This set was connected to the telegraph wire

by means of a long pole with electrical connections on the top. This pole was hooked over the desired circuit near where the telegraph wire connected to the insulator and crossarm. A wire would connect the hooks on this pole with the telegraph set.

In August 1876, Alexander Graham Bell applied to the Dominion Telegraph Company for permission to use their telegraph lines between Paris and Brantford, Ontario. The general manager thought Bell was a 'crank', and refused permission. His assistant, Lewis McFarlane, persuaded his boss to try the experiment.[15] The test was successful, and this event firmly established the telephone's future. The first commercial long distance telephone service was installed along the right-of-way of the Hamilton and Dundas Street Railway in 1879. The Hamilton and Dundas was the first known railway to use telephones for dispatching trains in Canada. One wire on the pole was reserved for long distance subscribers, and the other for train dispatching. By 1909 the CPR had included telephones for train dispatching as far west as Brandon, Manitoba.

TRAIN DISPATCHING BY TELEPHONE

C.P.R. Now Operates All Trains Between Sudbury and Manitoba by That Method.

The Canadian Pacific has now completed the installation of the telephone to replace the telegraph in the dispatching and operation of trains, practically all the way from Sudbury, Ontario, to Brandon, Manitoba. This embraces practically the whole of the Lake Superior division, and as this part of the system, particularly that which lies along the north shore of Lake Superior, is a hard one to operate in winter, the substitution of the telephone for the telegraph shows the confidence of the managers and engineers in the greater efficacy of the telephone in the operation of trains. It is believed that the ultimate economic superiority of the telephone over the telegraph will be demonstrated.

The result of the gradual introduction of the telephone for despatching purposes has been eminently satisfactory, and it is now declared to be only a question of time before it is carried all the way from the Atlantic to the Pacific. Upwards of a thousand miles have, it is stated, already been installed.

From the Montreal Herald, October 28, 1909

A Montreal train dispatcher about 1950. Note the use of both telegraph and telephone equipment, with the telegraph sounder at the far right, and the telephone switchboard below the mouthpiece arm. (CNR Archives, Montreal. Photo #X32489)

Developments in the (multiplexing) technology of telegraph and telephone transmission enabled more than one call to use the same wire at the same time. By 1927 the 'carrier current device' had been developed which was used to carry 10 Morse Code cyphers and two telephone calls at the same time.[16] Most railway stations were equipped with both telegraph and telephone equipment by this time.

It is interesting to note that not all railways were quick to replace the telegraph with the new telephone technology. For example, the Esquimalt and Nanaimo Railway on British Columbia's Vancouver Island, continued to dispatch trains by Morse Code until the early 1970s.[17] In 1972, Canadian Pacific Telecommunications closed its last remaining commercial Morse telegraph circuit at Batiscan, Quebec. The final message was: "This is the last telegram via Morse Code in Canada. What hath God wrought?" [18]

Canadian railway insulators marked with telegraph company names include the following:

Algoma Eastern Railway (**AER**)

This railway was incorporated in 1911 but was originally called the Manitoulin and North Shore Railway. As the M & NS Railway, it was to be built from Little Current to join the CPR near a place called Spanish River north of Lake Huron. About 1900 construction began southeast from Little Current towards Sudbury; from Tobermony to Meaford, Wiarton and into Owen Sound. It was leased by the CPR on July 14, 1931. All of its property, rights, equipment and paperwork became fully under the control of the CPR by 1958.

Canadian Northern Railway (**CNR**)

The Canadian Northern Railway was incorporated in 1892 to build from the east through the Cariboo and Bute Inlet in British Columbia and connect with the Esquimalt & Nanaimo Railway on Vancouver Island. In 1899 it began acquiring and amalgamating with numerous other railways. In 1956 the Canadian Northern amalgamated with sixteen other railways into the Canadian National Railway.

Canadian Pacific Railway (**CPR**)

The concept of the CPR actually began with the proposal to British Columbia to join Canada. It was first called the Canadian Pacific Railway in 1872 with the intent to build from Lake Nipissing to the Pacific Coast. The Inter-Oceanic Railway was incorporated in 1872 to build this line, but more specifically to Victoria or Nanaimo on Vancouver Island. In 1880 public lands were appropriated along the projected route from the Yellowhead Pass to the NWT boundary, and to the Burrard Inlet on the Pacific Coast. In 1882 the CPR was authorized to build their tracks through the Rocky Mountains instead of through the Yellowhead Pass. In June 1886 the CPR mainline was opened from Montreal to Vancouver.

Edmonton Dunvegan & British Columbia Railway (**EDR**)

The EDR was incorporated in 1906 to build from Edmonton through to Dunvegan and then along the Peace and Parsnip Rivers to Prince George in BC. On July 21, 1920, an agreement was made with the CPR to manage and

operate the railway until August 1926. The EDR was sold to the CPR and CNR in 1929 and is now the Northern Alberta Railway.

Grand Trunk Pacific Telegraph Company (**GTP, GTP TEL CO**)

The Grand Trunk Railway was incorporated in 1852 and was the main railway system in Canada for numerous decades. In 1902-1903, an agreement was made with the Federal Government to build westward . This was to stretch from Moncton, New Brunswick to Quebec City, then north and west to the Quebec-Ontario border, then north of Lake Nipigon into Winnipeg, Manitoba. From Winnipeg, it passed Battleford, Edmonton, and went through the Peace River Pass to Bute Inlet on the Pacific Coast.. Branch lines ran to North Bay, Montreal, Thunder Bay, Brandon, Regina, Prince Albert, Calgary and Dawson City in the Yukon. In 1919 the Grand Trunk turned operations over to The Canadian Government Railway, and it became part of the Canadian National in 1923. In 1956 all GTP branch lines and fifteen other companies amalgamated with the Canadian National. The Grand Trunk Pacific Telegraph Company operated independently of the railway. It was incorporated in 1906 and merged with the Canadian National Telegraph in 1928.

Great North Western Telegraph Company (**GNW, GNW TEL CO**)

The Great North Western Telegraph Company was incorporated in 1880. It absorbed the Montreal Telegraph Company in 1881, and then became the most significant telegraph company in Canada until the building of the CPR. The Great North Western Telegraph Company was acquired by the Canadian Northern Railway in 1915, and within three years it was under the control of the Dominion Government.

Hudson Bay Railway (**HBR**)

The HBR was incorporated in 1880 as the Nelson Valley Railway & Transportation Company, and was to build from the north shore of Lake Winnipeg to Hudson Bay at Churchill, Manitoba. The line was not completed until September 13, 1929.

Montreal Telegraph Company

The Montreal Telegraph Company was incorporated in 1847. By 1880 it had 30,000 miles of wire in operation, and was the major telegraph company in

Canada. It amalgamated with the Great North Western Telegraph Company in 1881.

Temiskaming & Northern Ontario Railway (**T & NO RY**)

This railway was incorporated in 1902 and was to be built from North Bay, Ontario to some point on Lake Temiskaming. By 1905 it had joined the GTP tracks. In 1912 an agreement was made with the Grand Trunk Railway for terminals in North Bay and to use their line from North Bay to Cochrane and beyond. In 1941 it acquired the Nipissing Central Railway, then in 1946 it became the Ontario Northland Railway.

Trans-Canada Railway Company (**TCR**)

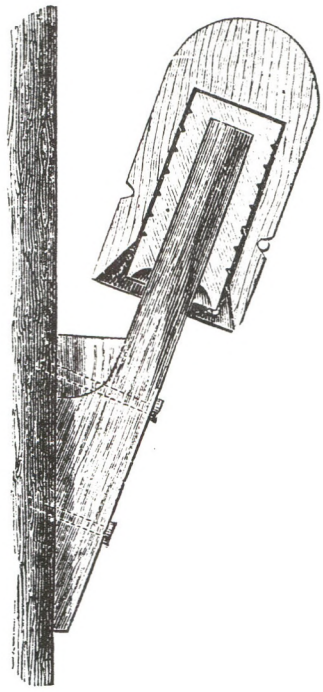
The Trans-Canadian Railway Company was incorporated in 1892 to construct a line from Quebec City to an undetermined area north of Lake Winnipeg. It was then to go west through the Yellowhead Pass through the Skeena River area to Port Simpson or Port Essington. In 1897 it changed its name to the Trans-Canada Railway.. In 1902 it was granted running rights over the Quebec and Lake St. John Railway.

Design Influences

The earliest known design of a telegraph insulator resembling the Canadian railway telegraph insulator was the 'Wade' type. In the US, Jepta Wade was responsible for the merging of several telegraph companies in 1854 resulting in the formation of the Western Union Telegraph Company. J.J. Speed, an associate of Jepta Wade's in the late 1840s and 1850s, is credited with the invention of a wood covered glass insulator in 1849. It was modified by Wade and largely promoted in the 1850s and 1860s.[19]

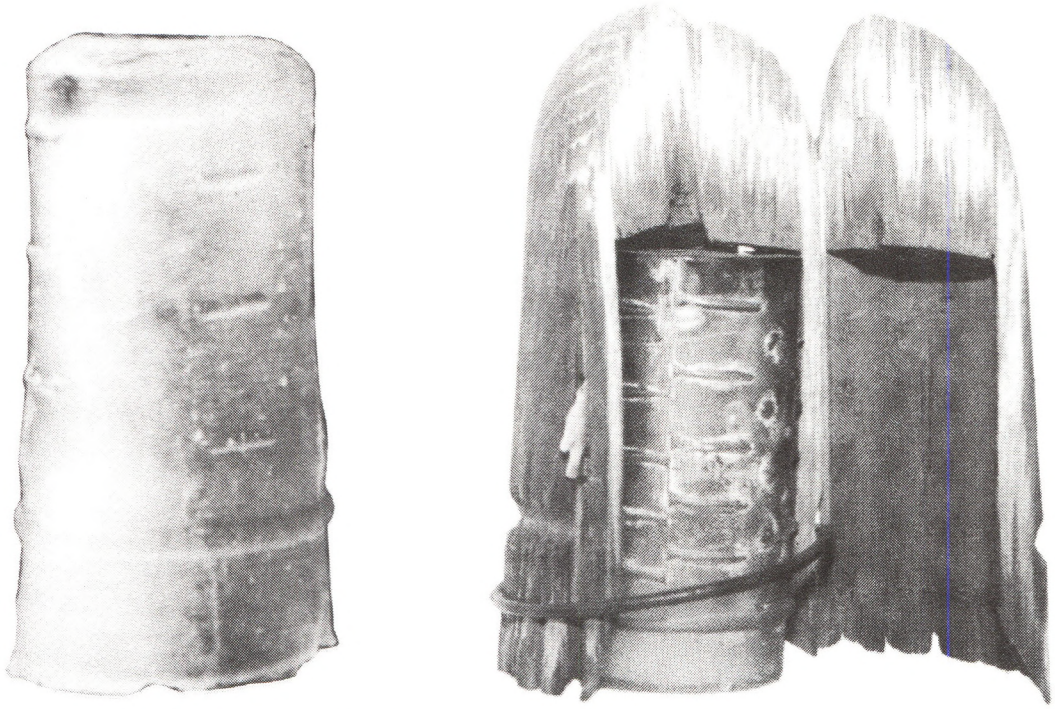
A few intact wooden specimens have been located over the years along with numerous styles of glass inserts, both in Eastern Canada and the US. This suggests that these were widely manufactured and used. There is one style that is specific to Canada which is shorter than the others and has raised dots and ridges on the outside. This provided an uneven surface for the glue to adhere when affixing them to the wooden outer parts.

Although these insulators were made of wood with a glass insert, they were the first of the general 'beehive' shape. This early insulator may have been the original influence in the design of insulator the Canadian railways specified for broad use.



"A glass insulator, covered with a wooden shield, to prevent fracture from stones and other causes, the wood being thoroughly saturated with hot coal tar, to preserve it from decay."

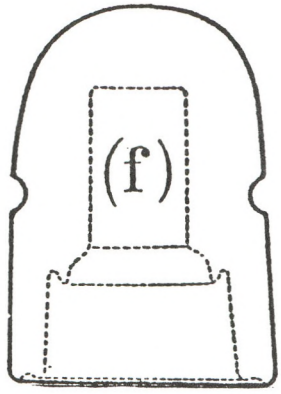
'Wade' insulator illustration and description from an 1874 telegraph manual.



Actual size glass insert and a 'Wade' type insulator with partially decayed wooden cover.
(Note the small arrowhead lodged in outer surface.)

Frederick Newton Gisborne is most likely the person responsible for the design of the Canadian railway "short beehive" insulator. He was a telegraph engineer and inventor. From 1849 to 1851 he was superintendent and chief operator of all government lines in Nova Scotia. In 1856 he laid the first underwater telegraph line on the Canadian side of the Atlantic, between Prince Edward Island and New Brunswick. He was also involved with Cyrus Field in the laying of the Atlantic cable. He was also the superintendent of lines for the Dominion Government Telegraph and Signal Service from 1879 to 1892.[21] He would have been well aware of the 'Wade' insulator.

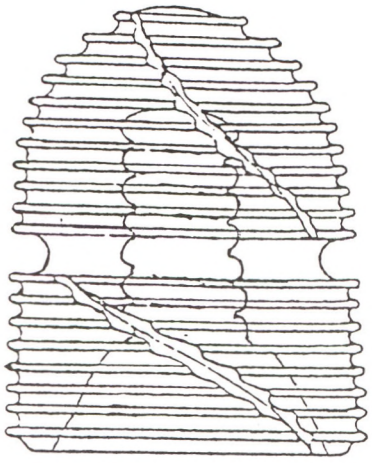
F.N. Gisborne obviously designed the white porcelain insulators with the grooved base bearing his name. They were imported from England and were made by the Bullers Jobson Company of London. The Bullers Jobson Company catalog of 1885 lists "Gisborne's Canadian" as an export item.[22] By 1888, Canadian Pacific had purchased 250,000 'Gisborne Pattern' insulators at a cost of 7¢ each. The cost of a comparable glass "Canadian Pacific" insulator at the time was 5¢.[23]



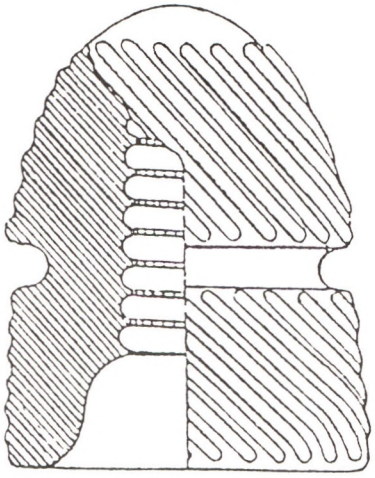
Buller Jobson & Co. 1885 catalog illustration of 'Gisborne's Canadian'.

Harvey Prentice Dwight was another telegraph official whose name appears on a Canadian railway insulator. H.P. Dwight became the Western Superintendent of the Montreal Telegraph Company in 1865 after being with the company since 1847. When the Great Northwestern Telegraph Company amalgamated with Montreal Telegraph in 1881, he became general manager, then president in 1892.[24] Two different glass insulators bear his name. One of these 'Dwight Pattern' insulators has a grooved base, similar to that of the Gisborne porcelain insulators. The Montreal Telegraph insulators can also be found with this grooved base. Dwight would have been in a position to influence design features in the insulators specified for use on Montreal Telegraph and Great Northwestern lines.

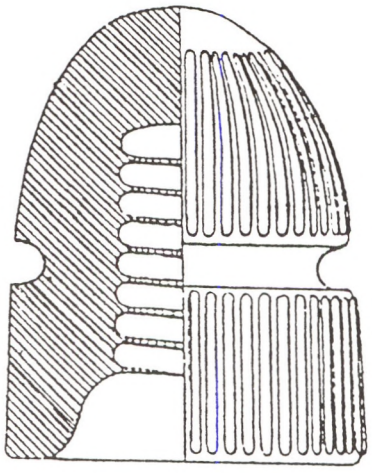
The next significant design influence of a Canadian railway insulator would be that of Frederick H. Withycombe. F. H. Withycombe was granted Canadian patent number 63026 in May of 1899 for seven design concepts pertaining to raised projections on an insulator's surface.[25] The drawings were modeled after the Canadian 'short beehive' style of telegraph insulator. Whithycombe stated in his patent application, *"to render insulators of whatever form, less liable to breakage by providing a simple and efficient means to enable them the better to withstand the impact of foreign bodies. The breaking down of the intercepting parts (ridges), cushions the blow and relieves the main portion of the insulator...from the full severity of impact".*[26]



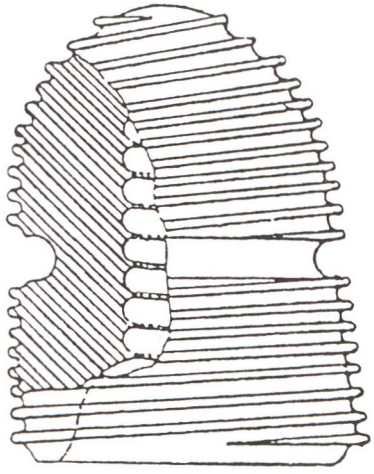
Patent drawing #1



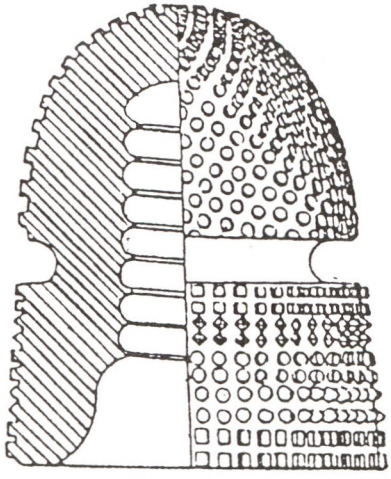
Patent drawing #2



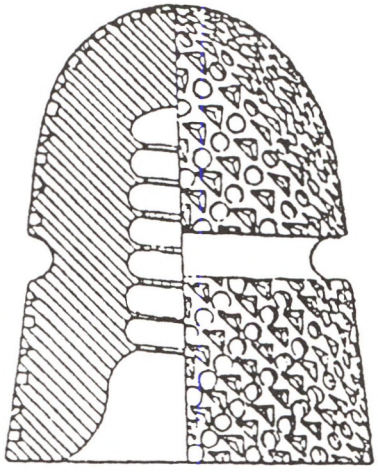
Patent drawing #3



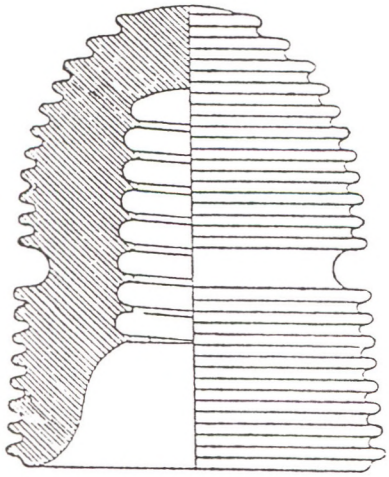
Patent drawing #4



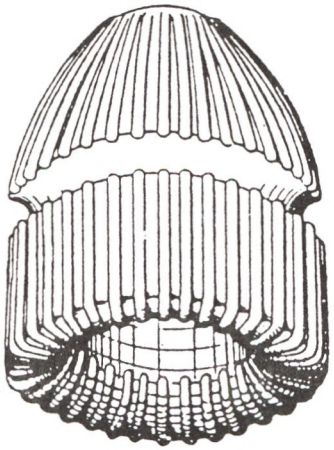
Patent drawing #5



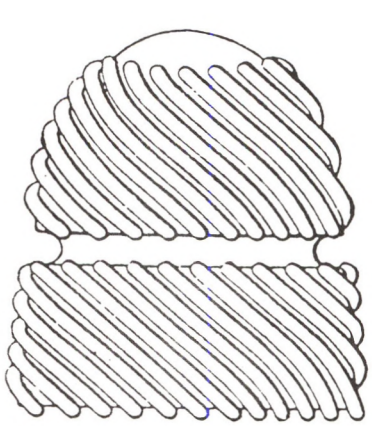
Patent drawing #6



Patent drawing #7



Patent drawing #8



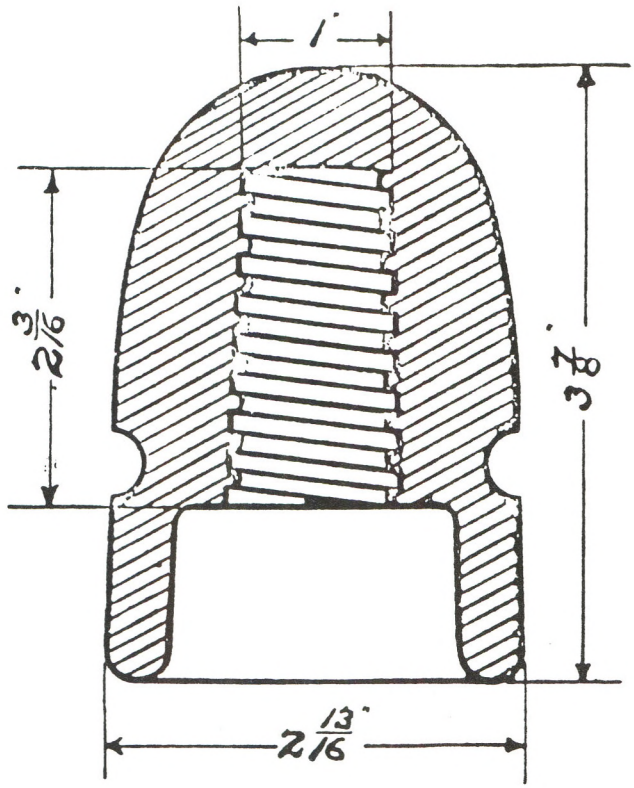
Patent drawing #9

Various illustrations from the Withycombe patent application of 1899.

Not all of the Withycombe insulators were manufactured as depicted in the patent drawings. In fact, several of them would prove to have been very difficult to have machined into a mold, with raised areas on the mold surfaces.

The designs that were used in insulator production were as follows:

illustration #3 type 7E
#4 type 7A, 7B, 7C, 7G
#7 type 7D

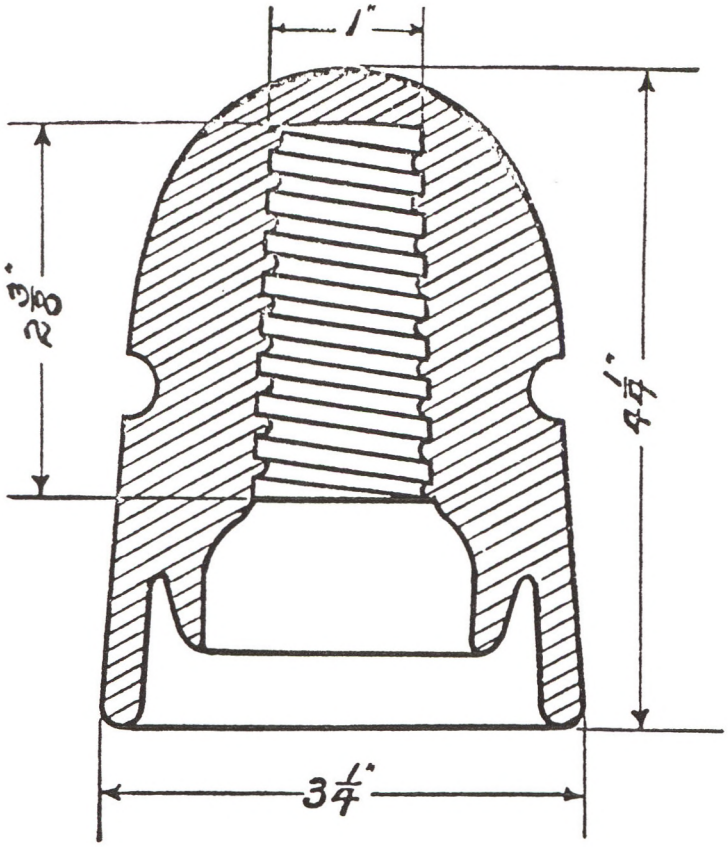


Stock No. 1671
STANDARD TELEGRAPH
INSULATOR

Average weight of each
17 oz.
Quantity per barrel, approx.
200
Approx. weight per 1000 packed
1275 lbs.

Dominion Glass Company insulator catalog
illustration of the CD-143 'Standard' telegraph style.

The Dominion Glass Company listed the CD-143 short beehive style in their insulator catalog from the 1920s. It was referred to as the 'Standard' telegraph style. It would be safe to assume that by this time the product being offered would have been embossed with 'STANDARD', sometimes using molds that were previously marked with a Canadian railway name.



HEAVY TELEGRAPH
DOUBLE PETTICOAT
INSULATOR

Average weight of each
25 oz.

Approx. weight per 1000 packed
1700 lbs.

Domion Glass Company insulator catalog
description of the CD-145 'Heavy Telegraph Style'.

The design of the CD-145 "tall beehive" insulator was one of numerous insulator patents obtained by Samuel Oakman of Melrose, Massachusetts. This particular patent was issued on February 12, 1884. In the patent application Oakman states, *"Heretofore insulators have been made which presented...an irregular and complicated form not pleasing to the eye. My design consists in having the insulator shaped so as to be a regular paraboloid, or so near to this form as to strike the eye as such"*. It seems as though he was intent on producing an insulator that would be pleasing to the eye. This style was adopted for use as the 'Heavy Telegraph Style' in Canada, and was also offered for sale in the Dominion Glass Co. catalog. It is possible that this patent influenced Gisborne to shape his insulator in the same manner, although it was smaller and had no inner skirt (petticoat).

UNITED STATES PATENT OFFICE.

SAMUEL OAKMAN, OF MELROSE, MASSACHUSETTS.

DESIGN FOR AN INSULATOR.

SPECIFICATION forming part of Design No. 14,674, dated February 12, 1884.

Application filed November 2, 1883. Term of patent 7 years

To all whom it may concern:

Be it known that I, SAMUEL OAKMAN, a citizen of the United States, residing at Melrose, in the county of Middlesex and State of Massachusetts, have invented and produced a new and original Design for Insulators, of which the following is a specification.

The drawing represents a perspective view of my design in elevation.

Heretofore insulators have been made which presented, when viewed in elevation, an irregular and complicated form not pleasing to the eye.

My design consists in having the insulator shaped so as to be a regular paraboloid, or so near to this form as to strike the eye as such. This regular paraboloidical surface is interrupted by a single equatorial groove, as shown in the drawing.

I claim—

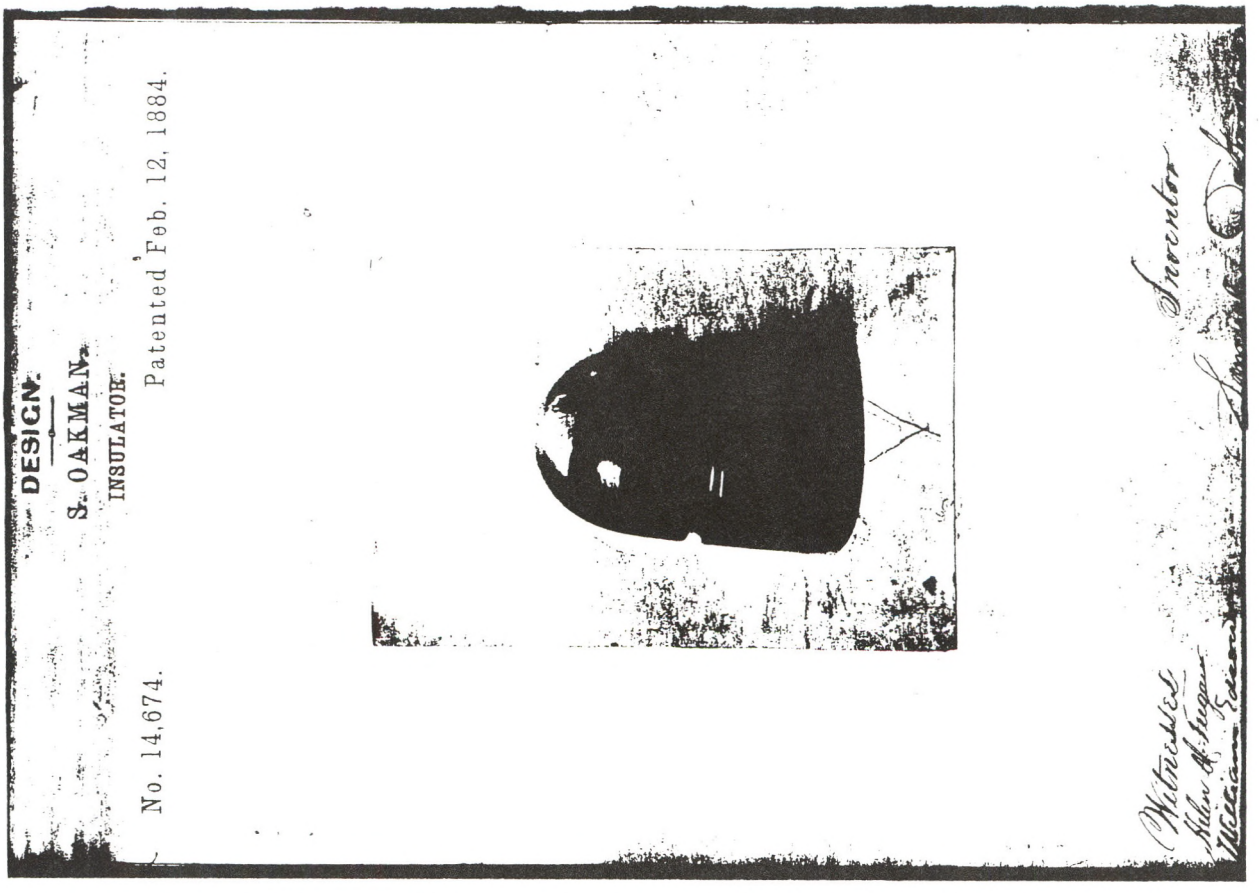
The design for an insulator herein shown and described, the body having the shape or configurations of the paraboloid traversed by an equatorial groove.

SAMUEL OAKMAN.

Witnesses:

HELEN M. FEEGAN.

WILLIAM EDSON.



Samuel Oakman's 1884 patent for the CD-145 large beehive-shaped insulator.

Glass Insulator Manufacture

There are a number of general families of glasses, some of which have many hundreds of variations in composition. Insulator and bottle glass was usually a simple soda-lime glass consisting of silica (silicon dioxide), soda (sodium oxide), and lime (calcium oxide). The soda-lime glasses are the oldest, lowest in cost, easiest to work, and the most widely used of all glasses.[27]

The raw materials were mixed and added to a 'tank' or vessel within a furnace. Often, broken or reclaimed glass would be added to the raw materials, and was referred to as 'cullet'. This mixture would then be heated to 2700°F. The working temperature for glass pressing is around 1830°F. Using earlier, hand-pressing technology, glass would be drawn off by hand, using a ladle, and poured into the insulator molds. The glass was then pressed, applying the plunger to the hot glass, and forcing it into all the extremities of the mold cavity. The plunger would then be lifted, and the glass insulator would be released from the outer mold body.

With the advent of semi-automatic insulator pressing machines, the hot glass would be drawn continuously from the furnace along troughs to the working area where it would be drawn off as portioned for each pressing. Mechanical equipment would perform the pressing and turning motions of the plunger.

The pressed glass was then transferred to an annealing furnace where the insulator would be held at annealing temperature (900°F) for several hours, then allowed to cool. This process was necessary in order to 'sweat out' the molecular water trapped within the glass. This process is not the same as tempering. If the glass was cooled without proper annealing, it would not be able to endure thermal expansion without forming internal stresses and cracking. Glass insulators had to be able to withstand the coldest of winters, as well as the hot blazing summer sun.

One of the most attractive features of these insulators is the wide range of colours in which they can be found. As glass colour is determined by the chemical components in glass making ingredients, some associations can be

made between glass manufacturers, regions of manufacture, and periods of manufacture. However, in the case of these glass Canadian railway insulators, few parallels could be drawn.

As many glass companies manufactured several product lines at one time, (i.e. various bottles and insulators), it would be safe to assume the colour of insulators would be of less importance than for bottles or other custom orders.

The yellow-green, green and aqua colour in most of this glass was caused by iron and copper impurities in the silica sand. This colour range in glass was determined by the location the silica was excavated from, and the amounts of impurities present.

Metal oxides were used in glass for colouring, as well as controlling other characteristics. Manganese dioxide (pyrolusite) was added to glass as a decolouring agent to change the crystal structure of iron oxide.[28] Small amounts of selenium (.6 to .8 oz. per ton), and serium have also been added to glass to neutralize the aqua tint of iron oxide.[29] After many years' exposure to the ultra-violet component in sunlight, manganese glass turned various degrees of purple, and selenium glass turned straw in colour.

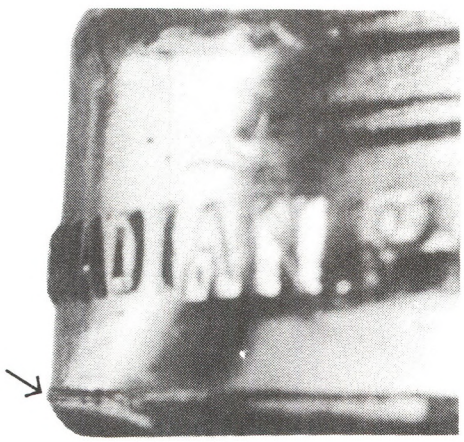
Cobalt blue glass was made with the addition of very small quantities of cobalt oxide. Amber glass was made with controlled amounts of sulfur and iron oxide which produced tints from pale yellow to dark brown amber.[30] Cobalt and amber glass were mostly used for medicine and beverage bottles to prevent entry of light rays. Insulators of these colours would most likely have been secondary products in glass factories where medicine bottles were being made.

Glass Molds

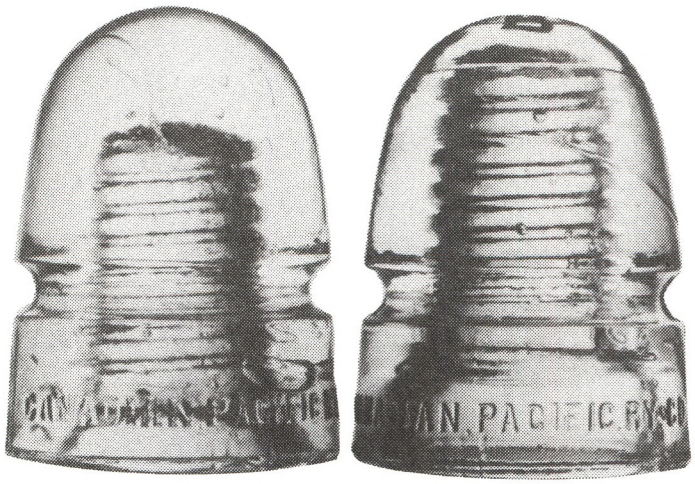
The technology employed in the manufacture of the CD-143 railway insulator spans an important time in the development of insulator production. With rapid railway expansion came the immediate volume demand for railway telegraph insulators. During this time mold engineering and glass pressing technology evolved from single, hand-pressed items to mechanized production systems. During this time there were many developments including the modern three piece mold, and such experimental concepts as the grooved base, double-threaded pin and the Withycombe ridges.

By closely examining each of the various insulator styles, much can be determined about the molds that formed them. By examining the effect the moving mold parts had in the forming of the glass, the engineering developments can be sequenced and roughly dated. Stationary and moving mold parts can be identified by examining the regions where the parts fit together, forming mold lines and pinch points. Some mold parts can separate a small amount during pressing, causing large mold lines, usually where the base mold parts meet the skirt sides.

There were always provisions in the design of a mold to allow for the inconsistent volume of glass portioned for each pressing. In some mold designs, this can alter the height of the insulator, but usually affects the depth of the plunger.



Large mold line produced by separating mold parts.

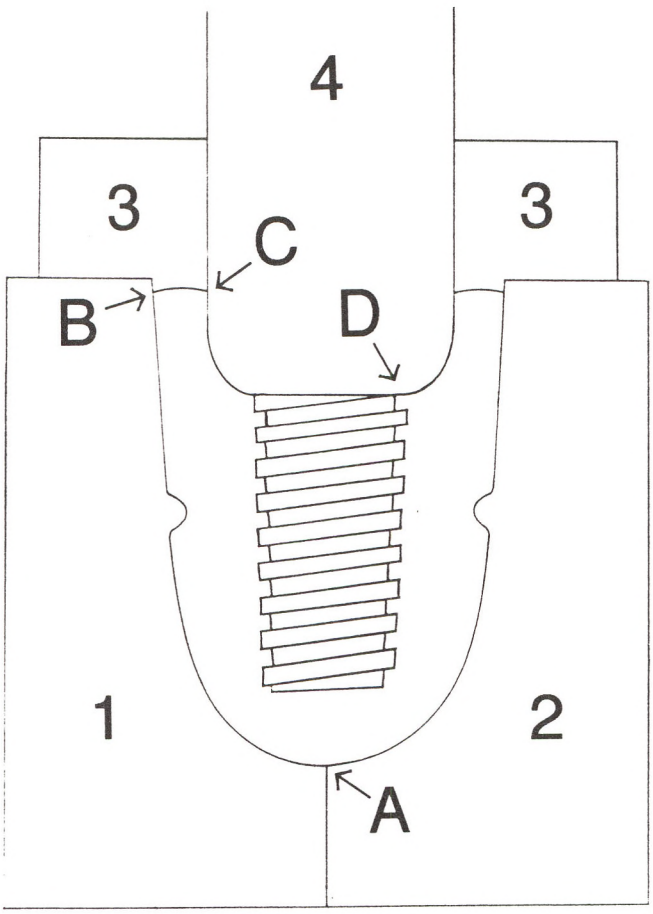


Mold style 1-D: Different volumes of glass produce different plunger depths.

Following are illustrations and descriptions of the four main mold groups used to form the majority of the CD-143 railway "beehive" insulators. The outside edges of the mold drawings are hypothetical, as only the areas of the molds affecting the shape of the glass are evident from examining the specimens. Detailed mold drawings will be included for each separate style in the listings that follow in the appendix.

Mold Group "A"

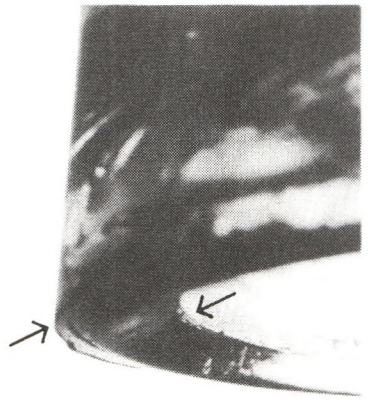
Insulators of this group are of the earliest mold technology used to produce the CD 143s and the CD 743s. The main features of this two-piece mold group are the mold line over the dome and the location of the pinch points on the base.



Mold group "A"

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend above the portion of the mold part '**3**' that forms the base (top plate). There is no pinch point at '**D**', indicating that the plunger (mold part **4**) also formed the insides of the skirt. A mold line at '**A**' indicates the use of a two-piece outer mold.

Most of the styles in this group have a swirl-start to the threads, indicating that the plunger rotated clockwise while being inserted, slowly twisting the soft glass. Insulator presses of this style would have had a threaded shaft above the plunger for backing the threads out of the hard glass, counter-clockwise. Rotating in the clockwise direction would lower the plunger mold part down into the glass.



Mold group "A" : Base pinch points

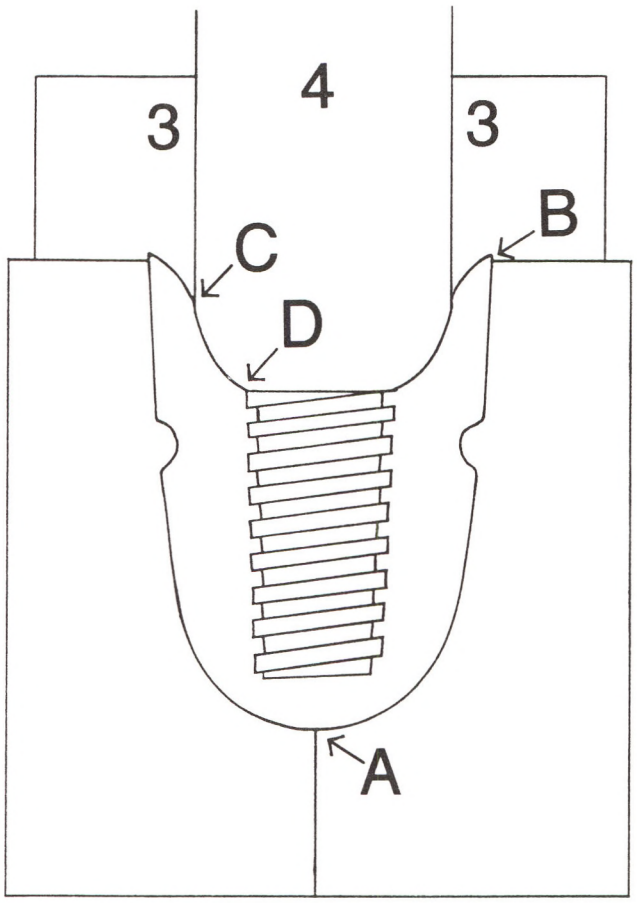
The mold parts that form the skirt extend beyond the mold part that forms the base, as indicated above by the pinch point location. Differences in the volume of glass can affect the height of some insulators pressed in this style of mold.

Mold styles formed in these types of molds are listed below.

Mold Type	Markings
1-A,1-B	CANADIAN PACIFIC RY CO and (Unmarked)
1-E,1-F	(Unmarked)
3-A,3-B	MONTREAL TELEGRAPH CO and (Unmarked)
3-C	CANADIAN PACIFIC RY (raised band style)
6-A,6-B	GREAT NORTH WESTERN TELEGRAPH CO
6-C	G.N.W. (raised band style)
6-D	G.N.W
8 (all)	(Unmarked)

Mold Group "B"

This group is very similar to manufacturing methods described in group "**A**", except the skirt extends a small amount beyond the mold line at the base (see point '**B**'). This style has top plate features similar to mold group "**D**", and plunger features similar to group "**A**".



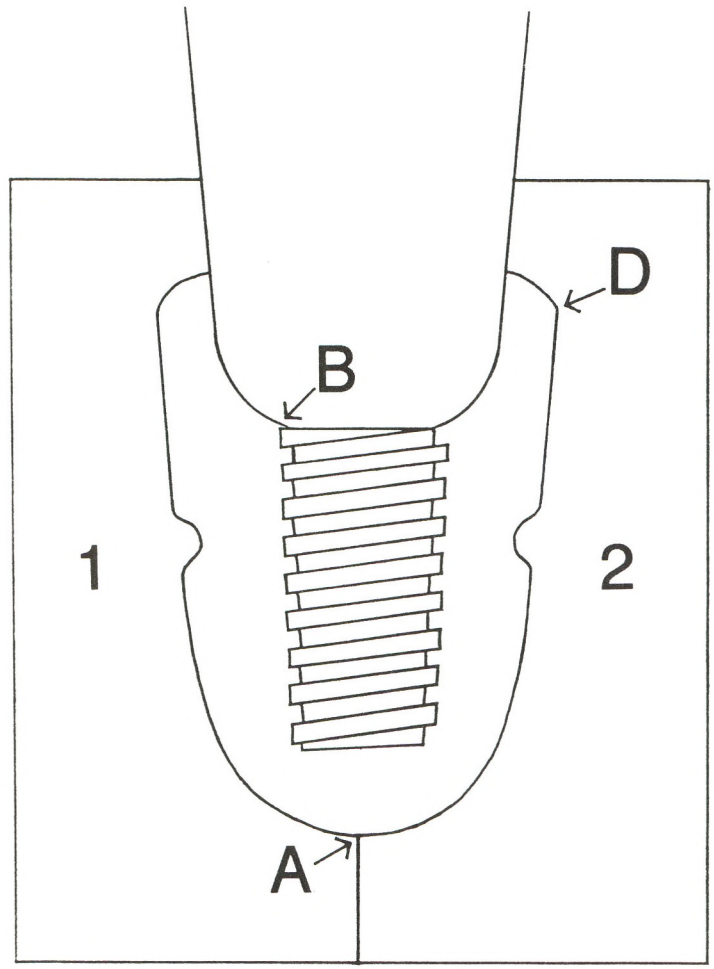
Mold group "B"

A very small portion of the skirt is formed by the top plate (mold part **3**). There is no pinch point at "**D**", therefore the plunger (mold part **4**) also formed the inside of the skirt as far as pinch point "**C**". This group also has a swirl start to the threads and a mold line over the dome. A mold line at '**A**' indicates a two-piece outer mold.

Mold Type	Markings
1-C	CANADIAN PACIFIC RY CO and CANADIAN PACIFIC RY CO (backwards "C")

Mold Group "C"

This mold group had the bases formed in a different way. There is a mold line across the base on each skirt side. This base feature is widely referred to as the "Hamilton base" in Canada, after the CD-162 Canadian insulator marked "Hamilton Glass Co.". 'Curved under' and 'rolled under' are also terms used to describe this particular type of insulator base feature. This feature also appears on four other unmarked Canadian insulators: the CD-162, CD-162.4, CD-134, and the CD-102, all unmarked, with the latter two being quite hard to find.



Mold group "C"

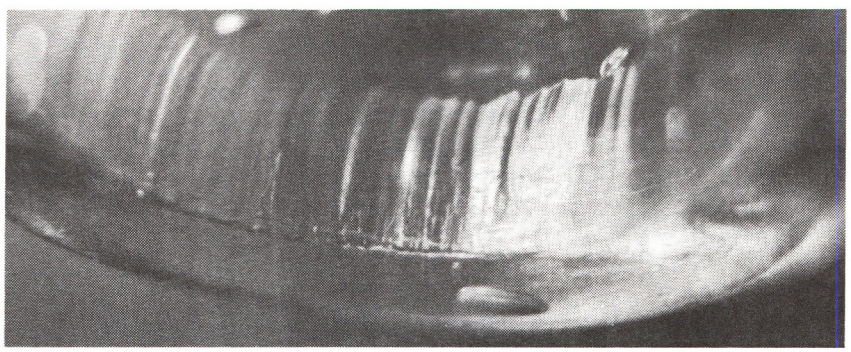
This mold group also has a mold line over the dome. The absence of a pinch point at "**D**" and mold lines across the base indicate that there was no top plate. The mold part that formed the sides of the insulator also formed the base. (Mold parts **1** and **2**.) The absence of a pinch point at "**B**" and swirl start to the threads indicate that the plunger (mold part **3**) also formed the inside of the skirt. A mold line at '**A**' indicates a two-piece outer mold.

This type of mold engineering has been seen extensively on "Brookfield" marked and Brookfield-made insulators from New York. This feature could be attributed to an American mold machinist, or a particular era in (the experimental process of) mold building technology. It would be safe to assume whoever made the molds for Brookfield also made these few Canadian molds. However, the Brookfield molds were all three-piece molds and therefore would have dated from a later period.

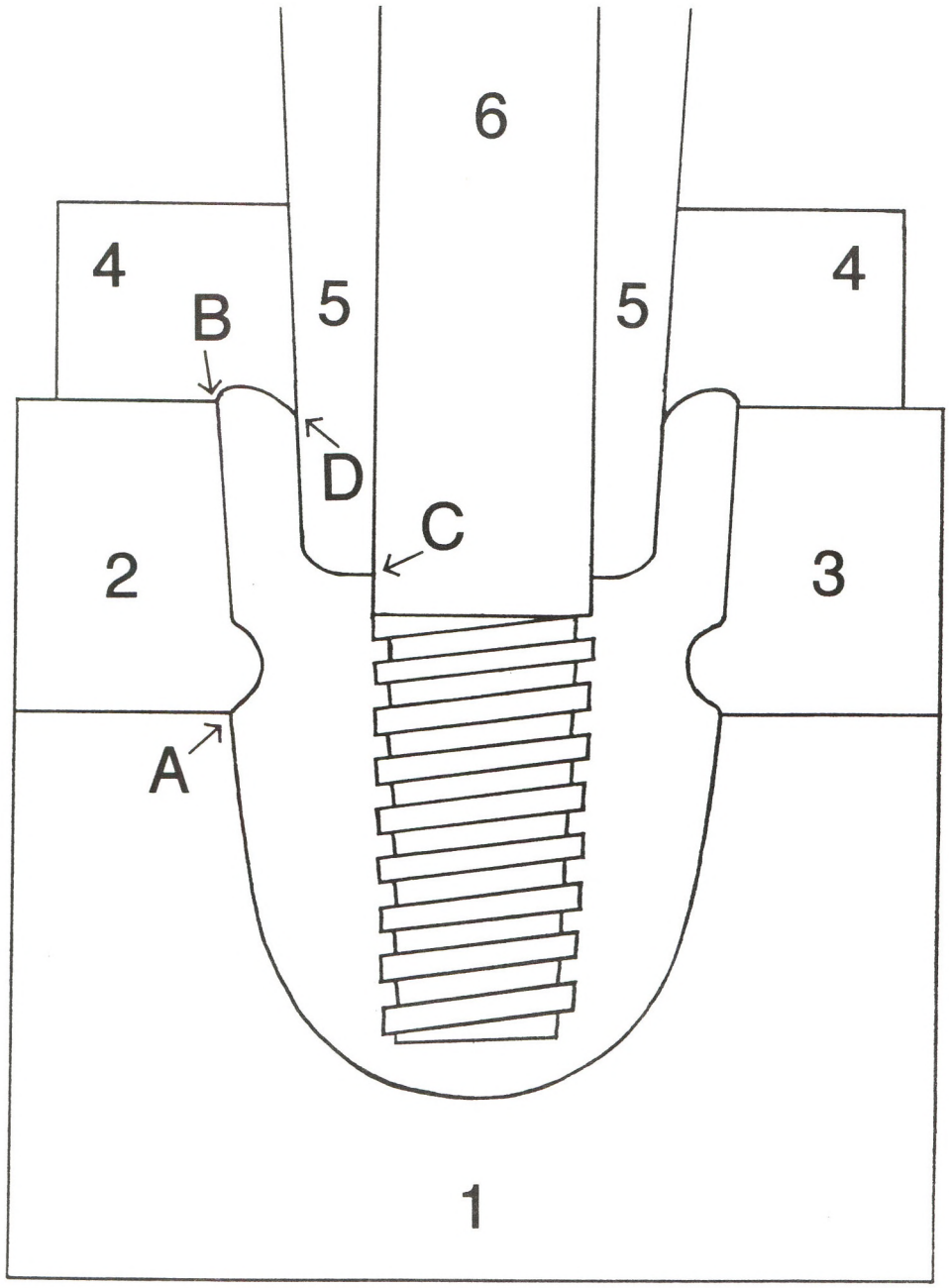
Mold Type	Markings
2-A	CANADIAN PACIFIC RY CO and (Unmarked)
2-B	CANADIAN PACIFIC RY CO and (Unmarked)
2-C	(Unmarked)

Mold group "D"

The design of molds in this group used more modern technologies than the three previous groups. This mold group included developments such as the three-piece mold (no mold line over the dome), and an additional mold part, the "*follower*". This would have been in the shape of a tube, and would have surrounded the plunger (or mandrel). On most "**1-D**" specimens, erosion or abrasion on the follower caused vertical scraping lines on the inside of the skirt. This would indicate that the follower was withdrawn straight out of the mold, at the same time as the plunger would have been rotating out of the threaded pinhole counter-clockwise.



Vertical scraping lines
found on the inside skirts of the 1-D insulators.



Mold group "D"

Unlike the other styles, the main body of this mold (mold part "**1**") formed the entire 'dome' of the insulator, as no mold line is visible above the wire groove. Mold parts **2** and **3** formed the sides and wire groove. The top plate (mold part **4**) forms the base only, as the follower (mold part **5**) forms the inside of the skirt. The skirt mold parts meet the main mold body at point "**A**", and extend to the top plate at point "**B**". The pinch point at "**C**" indicates that the plunger did not form the inside of the skirt. As the top plate and follower would be stationary during the pressing action of the plunger, the insertion of the plunger would produce another pinch point at "**D**" as it forced glass up into the base. No swirls or elongated bubbles in the glass near the threads indicate that the plunger did not rotate on insertion.

Canadian railway insulators formed in molds from this mold group contain the largest number of marking variations. This type of insulator would have been the one featured in the Dominion Glass Company catalog of 1927.

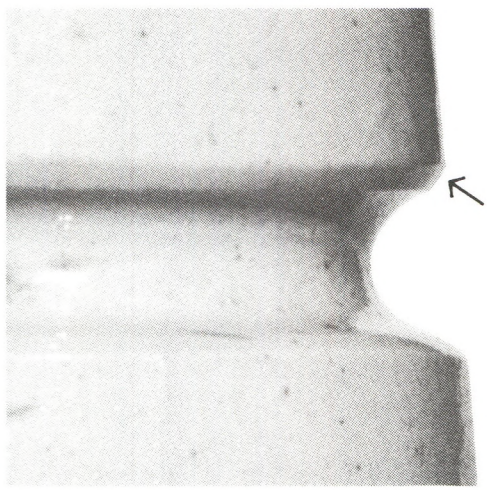
Mold Type	Markings
1D-1 to 1D-5	CANADIAN PACIFIC RY CO, and STANDARD
1D-6 to 1D-8	CNR STANDARD
1D-9	CPR STANDARD
1D-10	GNR STANDARD
1D-11	GPR STANDARD
1D-12	STANDARD
1D-13	(Various erasures)
4	CNR
5-A	(GNW) DWIGHT PATTERN
5-B	(GNW) DWIGHT PATTERN

Porcelain Insulator Manufacture

Porcelain differs in composition from pottery and china clays. While china clays are almost entirely composed of alumina and silica, porcelain contains an average of 50% vitrious material. (This vitrious material is usually feldspar, because of its glass-forming abilities and low melting temperature.) Electrical porcelain is generally made from blends of clay, quartz, feldspar, alumina, kaolin and flint.[31] It is a ceramic material, but the vitrious nature of its composition renders it non-porous. This is what separates it from other ceramics, and therefore is the desired property for use in electrical insulators.

"Wet-process" insulators were made of 'green' porcelain clay containing approximately 22% moisture.[32] This porcelain clay was cut into portions and pressed into molds which formed the general shape of the insulator. A series of additional 'trimmings' were applied to the insulator to form the wire groove and clean off excess material. A wet sponge was often used to smooth the outer surface.

Wet-process insulators that were incuse-marked were usually stamped at this time. Insulators to be stamped with an under-glaze marking would have the marking applied after the porcelain was air dried, prior to coating with clear glaze. It is also apparent that the European-made type-13 and type-23 items were first glazed white, then marked on the dome or skirt, and then 'overglazed' with a clear glaze.



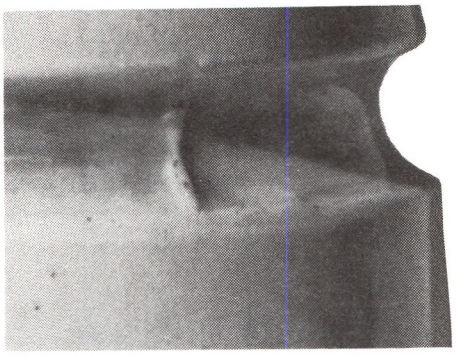
Wet-process trim line.

Incuse marking stamped into wet porcelain.

"Dry-process" insulators were made in a slightly different way. The green porcelain clay was further dried until it contained approximately 12% moisture, and then granulated until it was the size and consistency of snow.[33] This moist, granulated porcelain clay would compress just as snow when squeezed. This material was then portioned and pressed into two or three-piece molds which formed the entire insulator, including wire groove. Mold lines can often be seen on the dry-process items. Also, small crack-like lines can be seen through clear glaze on the dry-process insulators. These lines are the result of porcelain particles not completely pressed together during forming. The most accurate method used to identify dry process insulators is to locate these crack-like lines.

In the case of the Canadian railway dry-process insulators, the incuse marking would have been formed by a raised area welded or soldered to the inside of the mold.

Dry process CNR incuse marking (note the dry process cracks visible through the glaze.)



Mold lines are often visible on dry-process porcelain insulators)

The firing process is similar to that of other clays and potteries. Porcelain is fired at about 2300°F. in order to attain vitrification. This process is specific to porcelain, and that is how it differs from other fired clays. The feldspar and other glassy materials melt and bond with the clay particles to form a glass-like material full of clay 'dust'. Because of the high glass content, this material is not porous, as are other fired clays and potteries.

Small crack-like lines in the surface of dry-process items.

A 'flake' off the surface of a white porcelain insulator reveals bubbles in the transparent glaze.

It is often assumed that these insulators are glazed white. In most cases, they are white porcelain with a clear glaze over the surface. It is my opinion that clear glazes were used for inspection purposes. The actual body of the insulator could be examined for cracks or flaws through this clear glaze. With closer examination, very small bubbles can be seen in thick or drippy areas of the glaze. These would not be visible with an opaque white glaze. Also, the different coloured granules of the porcelain ingredients can also be seen through this glaze.

There are two gray coloured ceramic insulators mentioned in this reference that have a brown glaze on the surface. Although even 1% iron oxide as an impurity in porcelain can change the colour to reddish-brown, it is assumed that these (two) items were made of gray pottery clay, not porcelain. There are also two known styles (and possibly another) mentioned in this document which were made of white porcelain, and coated with a brown glaze.

Threading

This section on threading has been included because there is some variation in the threading of the Canadian railway insulators.

The first pin-type insulators were threadless. It was not until July 25, 1865 that Louis A. Cauvet obtained US patent number 48906 for a threaded insulator. After some difficulty promoting his idea to glass companies in the New York area, James and William Brookfield finally acquired the rights to his patent. The Brookfield threaded insulator quickly became the industry standard.

It is uncertain when insulators with threaded pin-holes were first made in Canada, as Robert McMicking of Victoria, B.C., had threadless insulators manufactured bearing his name in 1875. This was ten years after the US Cauvet patent for threads. The threadless Canadian railway insulators mentioned in this book may have been made after the advent of threads for use as replacements on threadless pole line equipment. Several of these threadless molds were also used with threaded mandrels to produce threaded pin-holes. (See appendix 1.)

Several of the older mold styles of CD-143 'short beehive' insulators have a wide variation in threaded pin-hole width. Notably 1C and 3C styles. The 3C style has been found with a smaller pin-hole than the standard 'Acme' 1-inch thread. A narrower wooden pin has also been found with the following insulator attached.

The wooden pin on the top is the standard 'Acme' 1-inch pin. The item below is the 'thin-pin' as found on Canadian Pacific telegraph lines. Note the narrower profile.

Type 3-C Canadian Pacific insulators. The one on the left is the normal width, the one on the right has a much narrower pin-hole.

Type 1-C regular pin-hole on the left, and 1-C with wider pin-hole on the right.

Another unusual pin-hole width has been found in the 1-C style of Canadian Pacific insulator. It is uncertain if this was intentionally made, or if the mandrel was off-centre while being rotated. This would have produced a wider than normal pin-hole cavity.

Perhaps the most unusual feature of a threaded insulator is the Canadian railway insulator with the double thread pitch. This item can look usual at first glance, but upon closer examination, a steeper thread pitch is easily noticed. To date no examples of double-threaded wooden pins have been located.

This development would have facilitated the faster mounting and removal of the insulators, as every complete revolution would advance the thread twice as far as the normal thread pitch. It may also have been an attempt by a Canadian glass maker to produce a threaded insulator without infringing on the US patent.

Type 8C single and double-threaded.
Note the steeper thread pitch on the double-threaded item on the right.

Numbering Systems

In the 1880 to 1930 period the CD-143 shape of Canadian railway insulator was the most popular style for communications lines of that type. This resulted in the style becoming a high production item which spanned several decades of manufacturing and use. Because of the numerous varieties of this style at least two separate previous attempts have been made at documenting these insulators.

In 1973 R.J. Gauci and Rollo McDonald of Ontario initiated a study on Canadian insulators. The report entitled, "Inventory of Canadian Insulators" was not completed, but did include an accurate listing of known C.N.R. marked railway insulators. The listing of these specimens is included in the cross-reference (Appendix 2).

In 1980, Grant Salzman of California, introduced a numbering system for the identification of the CD-143 Canadian railway "beehive" insulators. As many collectors have accepted this system, its methodology and much of the actual mold type numbers have been adopted for use in this reference. However, some changes have been made in order to more accurately describe individual molds.

In this book there is also reference to "CD" numbers describing glass insulator shapes, and "U" numbers describing porcelain.

In 1954, N.R. Woodward developed a numerical system for the identification of glass insulators shapes. First published in 1956, his 'Consolidated Design', or "CD" numbering system was quickly adopted by researchers and collectors and has been continually expanded as new material surfaces.

A similar system was developed in 1971 by Jack Tod for describing porcelain insulator shapes. This 'Universal' style system consists of a "U" number listing for uni-part (single part), porcelain insulators. This system was expanded in 1982 by Jack Tod, to include international porcelain shapes.

Methods Used to Produce Illustrations

The embossing illustrations in this study were produced by pressing the insulator in foil, and then highlighting the raised areas formed by the embossing. This method produces an accurate representation of the curved insulator surface in a flat format. These illustrations, although unfamiliar in the flat perspective, are very accurate. Mold lines have been included where possible to indicate the position of the embossing on the mold body.

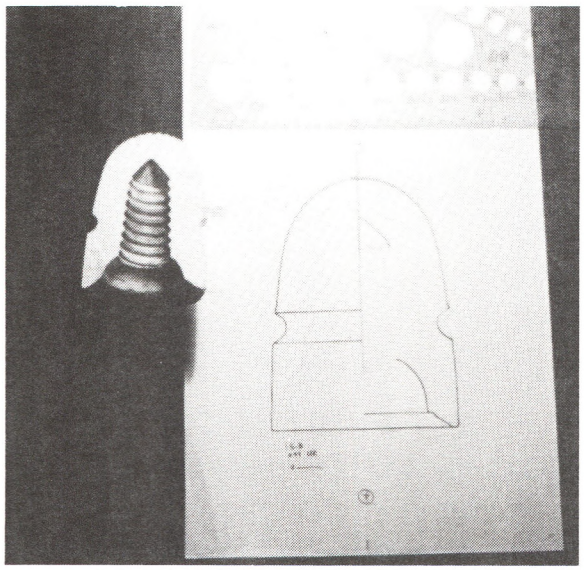
Illustrating embossings from foil impressions.

Embossings with very deep engraving have slanted sides. This feature facilitates easy removal from the molds, as raised areas can prevent the glass from being easily released. This type of engraving is commonly known as 'chisel point' embossing, and can be found on many mold styles including most of the CD-145 specimens and all the CD-143 type-4 items.

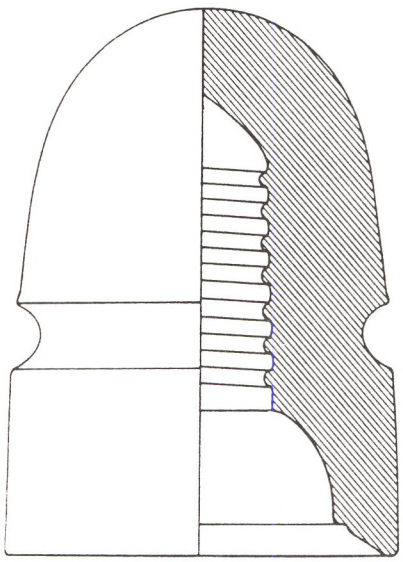
'Chisel point' embossing and regular height embossing.
Only the highest areas on the embossings are illustrated.

As only the highest areas in the 'chisel point' embossings are highlighted, they can appear unfamiliar. If a specimen's embossing cannot be located in the appendix listings, then it may be necessary to produce a foil impression of the specimen. This will provide a similar, flat embossing strip which may be easier to identify with an illustrated example.

The insulator profile illustrations were drawn from photographs, actual specimens, shadow profiles and sawn cross-sections. The outer sides of the glass mold parts are hypothetical, as only the inner surface areas that formed the glass are known.



Drawing from a cross-section.



Finished drawing.

As wet-process porcelain insulators have individually formed wire grooves and trimmed areas, an average profile of features is represented in the drawings. Where there are large differences within a single style, a comparative photograph is included to demonstrate these differences. The dry-process porcelain items had the wire groove formed in the molds, so there is not much variation within the same style unless more than one mold was used (i.e. type 15-B CPR).

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1. History, Theory and Practice of the Electric Telegraph, George B. Prescott, 1866. Page 234

2. Canadian Rail, issue # 425, November - December 1991, page 189.

3. Canadian Rail, issue # 425, November - December 1991, page 187.

4. Canadian Rail, issue # 425, November - December 1991, page 188

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6. Canadian Rail, issue # 425, November - December 1991, page 188

7. Dots and Dashes, April-May-June, 1979, page 9.

8. History of the Canadian Pacific Railway, H.A. Innis, page 133

9. Dots and Dashes, July-August-September 1974, page 4

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13. Dots and Dashes, April-May-June 1977, page 9

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15. The Canadians - Alexander Graham Bell, A.R. Petrie, page 32

16. History of the Canadian National Railways, G.R. Stevens, page 331

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18. Canadian Rail, issue # 425, November - December 1991, page 211

19. Insulators, A History and Guide to North American PinType Glass Insulators,Volume 1, 1990, page 9

20. History, Theory and Practice of the Electric Telegraph, George B. Prescott, 1866.Appendix, page 60

21. Crown Jewels of the Wire, December 1991, pages 11-12

22. Insulators, Crown Jewels of the Wire, August, 1883, page 7.

23. Crown Jewels of the Wire, December 1991, page 17

24. Crown Jewels of the Wire, January, 1989, page 4

25. Crown Jewels of the Wire, August, 1987, page 19

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27. Materials Handbook, 12th Edition, George Brady & Henry R. Clauser, McGraw-Hill, 1986, page 354

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29. Materials Handbook, 12th Edition, George Brady & Henry R. Clauser, McGraw-Hill, 1986, page 708

30. Materials Handbook, 12th Edition, George Brady & Henry R. Clauser, McGraw-Hill, 1986, page 360

31. Materials Handbook, 12th Edition, George Brady & Henry R. Clauser, McGraw-Hill, 1986, page 197, 305, 424, 640

32. Porcelain Insulators Guide Book for Collectors, Third Edition, Jack H. Tod, 1988. Page 13

33. Porcelain Insulators Guide Book for Collectors, Third Edition, Jack H. Tod, 1988. Page 15

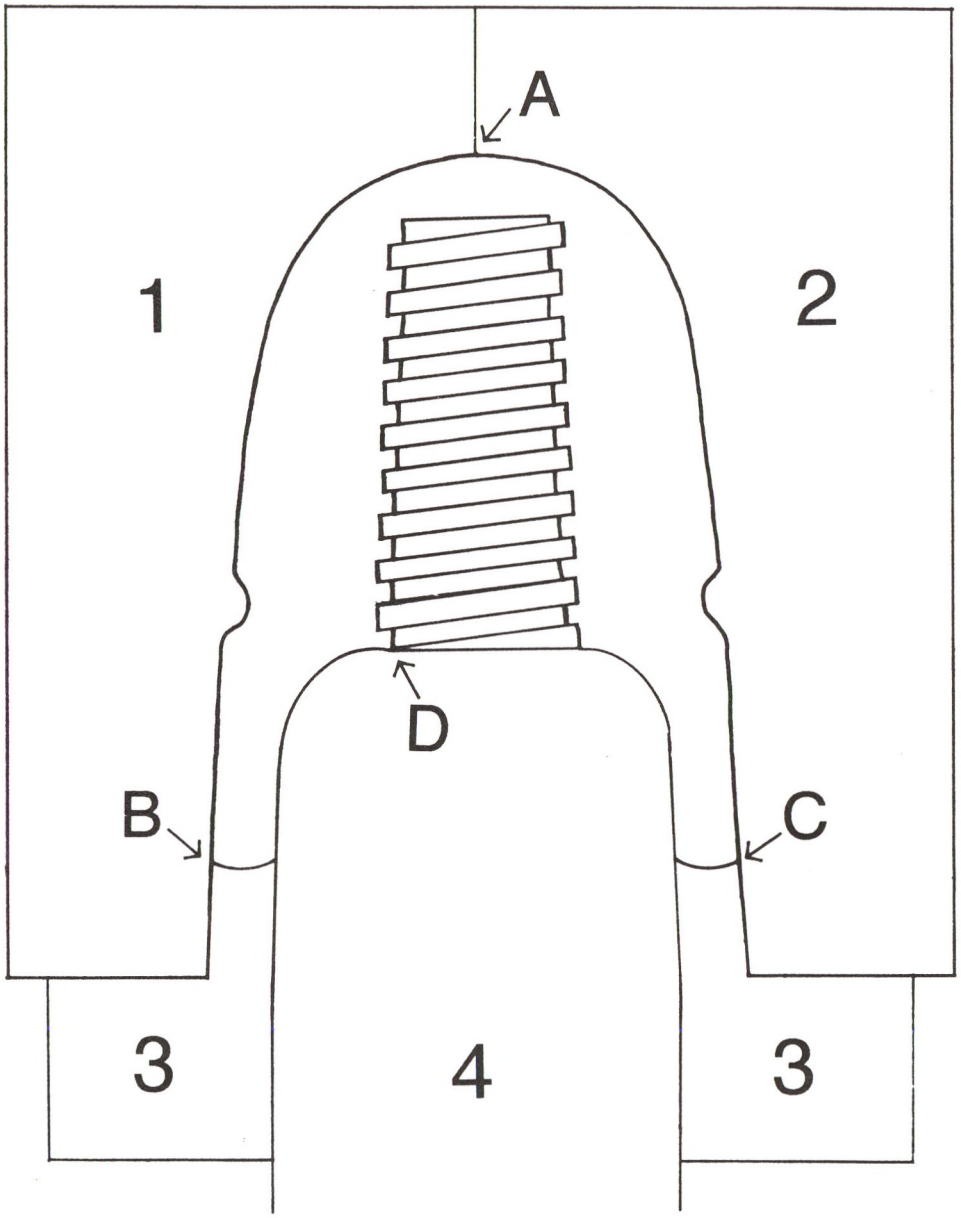
Appendix 1

Canadian Railway "Beehive" Insulators Known to Exist

1-A

CANADIAN PACIFIC RY CO

CD-143

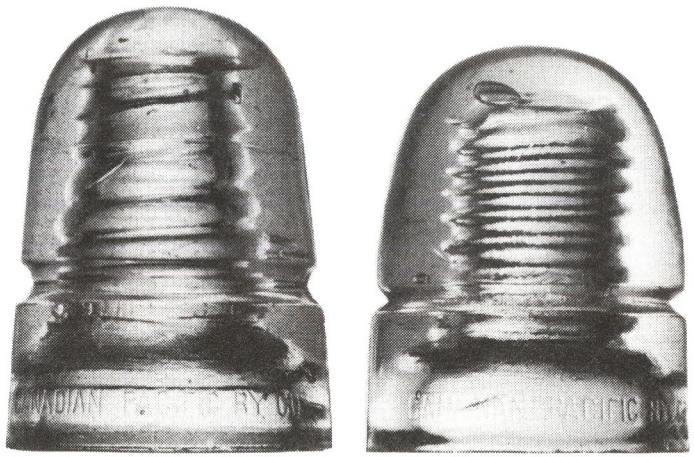


1A1A

1-A

CANADIAN PACIFIC RY CO

CD-143



1A and 1A slumped.

1A base detail

Thin embossing of the 1A

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

The 1As have a mold line over the dome and a swirl start to the threads. The embossing is very light . Numerous specimens of this mold style are slumped, giving them a chubby appearance with a pinched wire groove. These pieces have been roughly dated from 1884 to 1887.

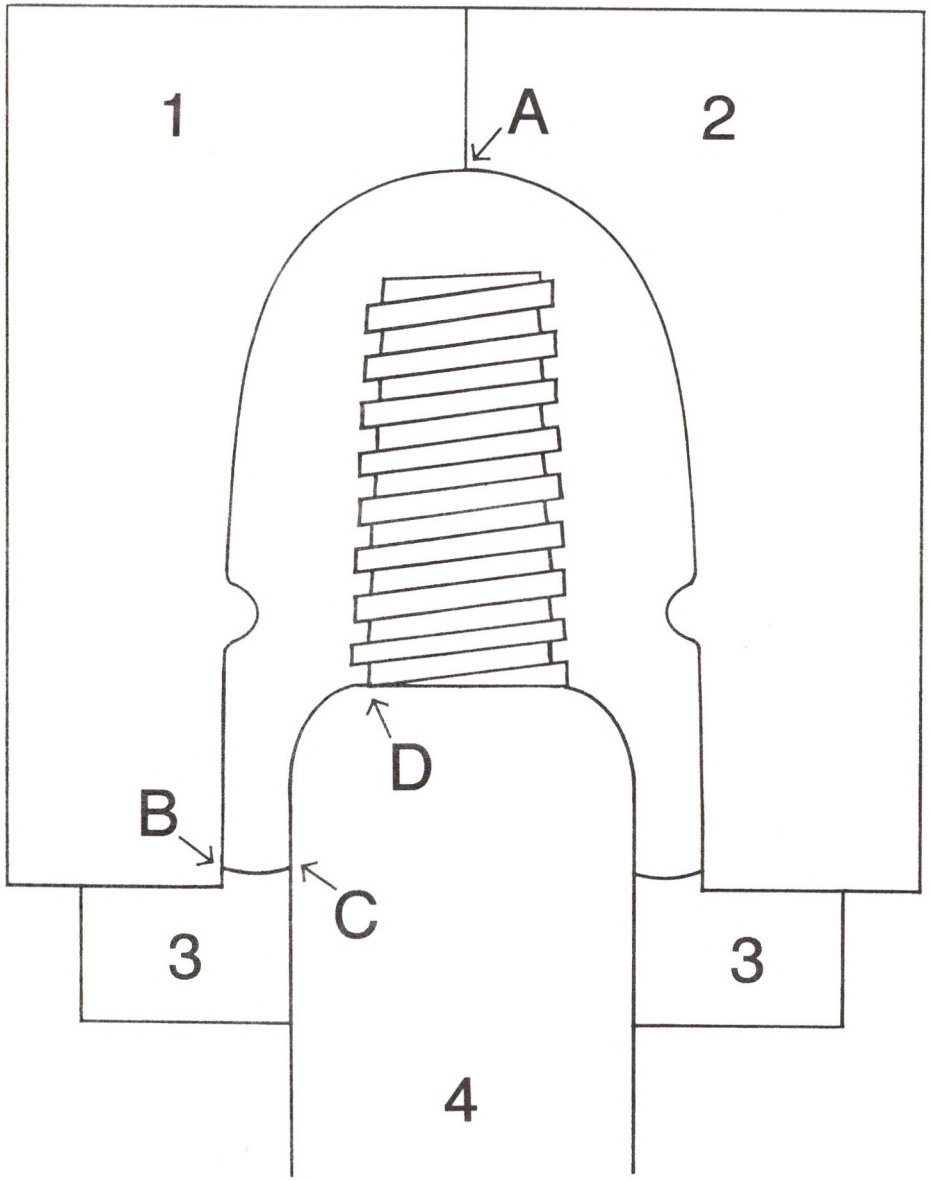
The 1A **CANADIAN PACIFIC RY CO** have been found in the following colours:

light yellow green
light green
sage green
aqua
blue aqua
light purple
purple
clear

Very thin embossing,
no periods.

CANADIAN PACIFIC RY CO

1A-1A



1-B

CANADIAN PACIFIC RY CO and *(UNMARKED)*

CD-143

1B1A

1-B

CANADIAN PACIFIC RY CO
and *(UNMARKED)*

CD-143

The 1B sometimes appears
with squeezed inward skirts.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

The 1Bs are similar to the 1As, but have heavier embossing and very thin, straight skirts below the wire groove. They were generally made of better quality glass, with better quality control. Several of these 1Bs have been found with the skirt bent inwards near the mold lines. It would be safe to assume the tool used for removal from the mold would have squeezed the hot glass in this location. The 1Bs could be dated in the 1888 to 1890 period, based on manufacturing quality and mold features.

The 1B **CANADIAN PACIFIC RY CO** and 1B **unmarked** have been found in the following colours:

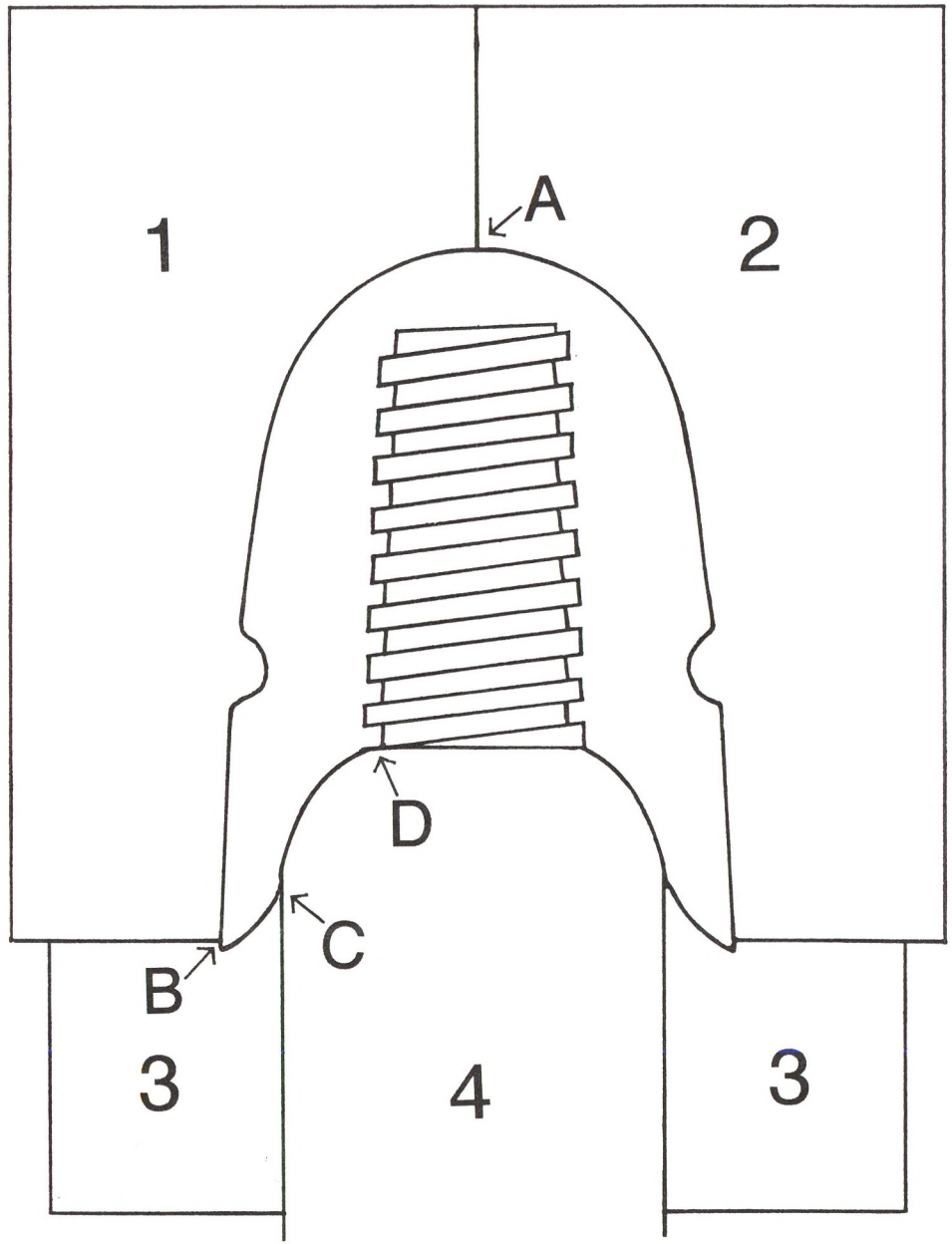
aqua
light blue
blue
green aqua

Wide "**A**" in "**PACIFIC**", wide "**Y**" in "**RY**". Embossing closer to right mold line.		**1B-1A**
Low "**A**" crossbars in "**CANADIAN**", unusual "**C**" in **CO**".		**1B-1B**
	(NO EMBOSSING)	**1B-2A**

1-C

CANADIAN PACIFIC RY CO

CD-143



1C1B

1-C

CANADIAN PACIFIC RY CO

CD-143

1C: three base slopes

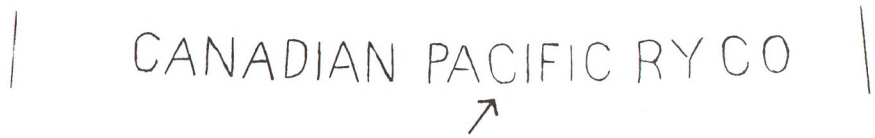
This group is similar to manufacturing methods described for the 1As and 1Bs, except that the skirt extends beyond the length of the mold parts that form it (at point '**B**'). The remainder of the skirt sides were formed by the mold part that also forms the base. (Mold part **3**) There is no pinch point at '**D**', therefore the plunger (mold part **4**) also formed the insides of the skirt as far down as point '**C**'. A mold line at '**A**' indicated the use of a two-piece mold.

Although the 1Cs were formed in two-piece molds with swirl-start to the threads, they had a more modern base feature than other two-piece molds. In this mold series, there were 3 different base plates used (mold part **3**), each of a different inward slope. It is in this style that the familiar backwards 'C' can be found. The 1Cs have been roughly dated from 1891 to 1897.

The1C **CANADIAN PACIFIC RY CO** and 1C **unmarked** have been found in a wide range of colours:

off clear	aqua	royal purple
very light green	light blue	yellow olive green
light green	blue	swirled green milkglass
gray	purple tint	
light aqua	light purple	

Tilted "**C**" in "**PACIFIC**",
wide, round "**C**'s"
in "**PACIFIC**".



1C-1A

High "**C**" in "**CANADIAN**",
bottoms of "**C**'s" in
"**PACIFIC**" are not round.

1C-1B

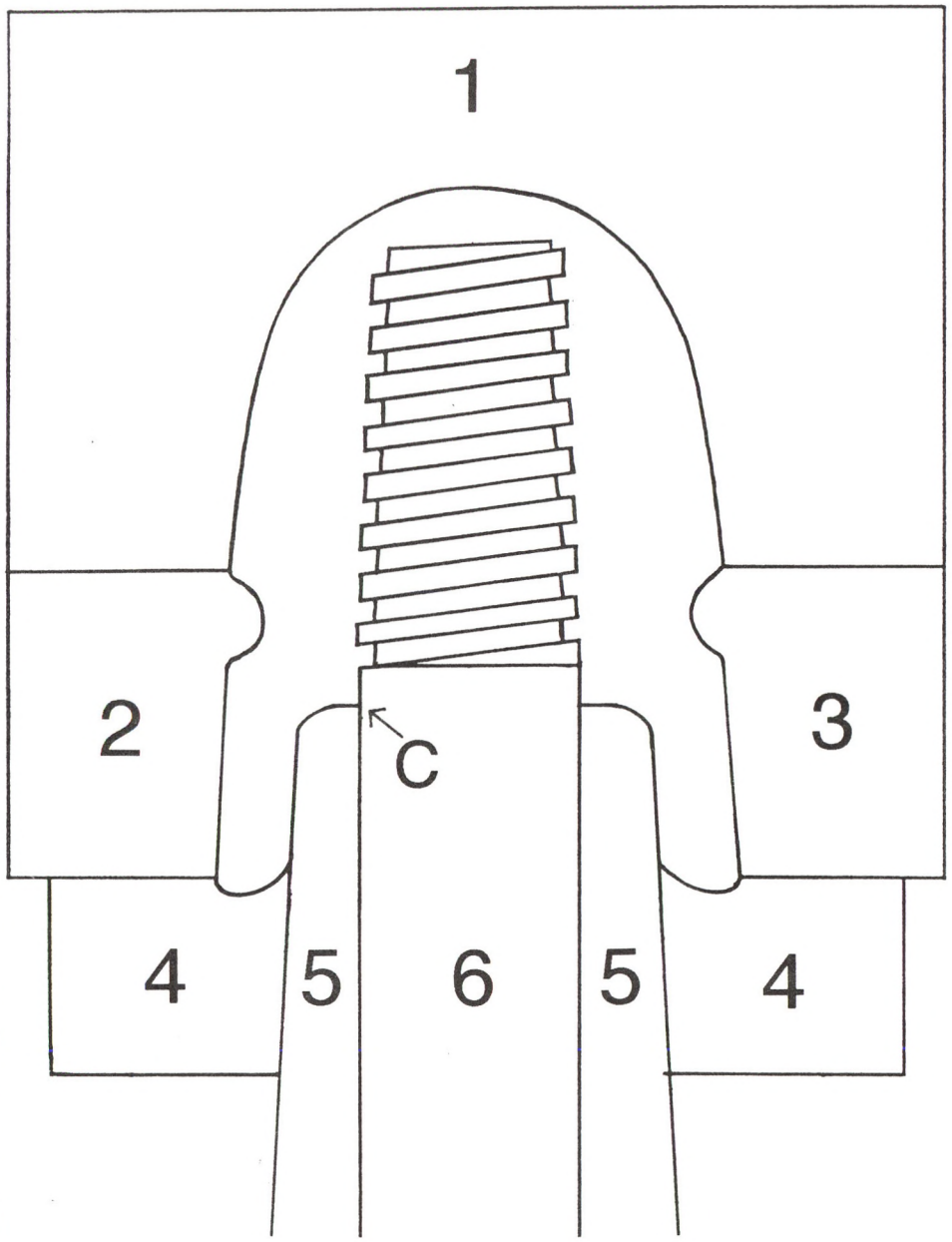
Shorter, thin embossing.

1C-1C

Backwards "**C**" in
"**PACIFIC**",
thin embossing.

1C-2A

Backwards "**C**" in "**PACIFIC**" thicker embossing.		**1C-2B**
Note periods.		**1C-3A**
	(NO EMBOSSING)	**1C-4A**



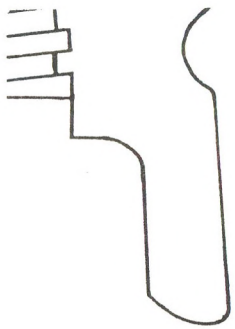
1-D

CANADIAN PACIFIC RY CO
C N R
G N R
G P R
C P R
STANDARD
(VARIOUS ERASURES)

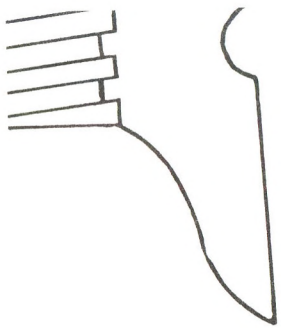
CD-143

1D

1-D



Typical 1D base



1D sloped base.

1D 'early follower' and 1D 'improved follower'.

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The pinch point at '**C**' indicates that the plunger (mold part **6**) did not form the inside of the skirt. No swirls or elongated bubbles in the glass near the threads indicates that the plunger did not rotate on insertion. Vertical scraping lines on the inside of the skirt indicates that the follower was also removed without turning.

The bases on these insulators are very consistent, with one exception. There are a number of 1D insulators with an angled inward base similar to the 1C mold type.

There were two distinctly different 'followers' used to produce the 1D insulators (mold part **5**). The 'early follower' produced a much thicker skirt, and often left vertical scraping lines on the inside of the skirt. The 'improved follower' produced thinner, smooth skirts and usually had less glass in the pressing by volume. These 'improved follower' specimens usually had the plunger inserted farther into the mold, producing a higher thread cavity than the 'early follower'.

The type 1D molds are all modern three-piece molds and have no mold line over the dome. Several of the type 1D molds were engraved with railway names, erased, and re-engraved several times, and contain numerous partially erased markings. The long production span of the type 1D insulators has been dated from 1903 to 1931.

1D-1

CANADIAN PACIFIC RY CO

(No periods)

The blotted-out embossing of **STANDARD** which appears on the rear skirt of the **1D-1** items and numerous other **1D** insulators.

The embossing on the **1D-1** insulators have no periods.

1D-1

The 1D-1 **CANADIAN PACIFIC RY CO** insulators have been found in the following colours:

ice aqua
light aqua
off-clear
ice aqua with SCA swirls
purple tint
royal purple
SCA

No periods.

'**STANDARD**' blot-out on rear.

FRONT

1D-1A

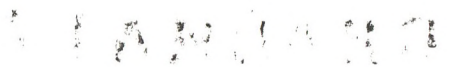
BACK

Very similar, perhaps re-worked **1D-1A** embossing.

'**STANDARD**' blot-out on rear.

FRONT

1D-1B



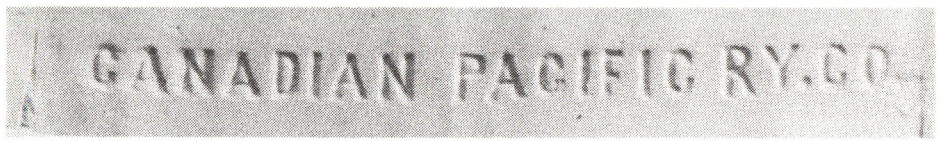
BACK

1D-2

CANADIAN PACIFIC RY. CO.

(note periods)

1D-2E blot-out of large '**CNR**' on front skirt.



1D-2 embossing detail with two periods.

The **1D-2** insulators were pressed in molds using the 'early follower', and were generally quite heavy, with a large volume of glass used in the pressings. This often resulted in shallow plunger insertions, and produced insulators with a large amount of solid glass in the dome, and low threaded pin-hole.

The 1D-2 **CANADIAN PACIFIC RY. CO.** insulators have been found in the following colours:

ice aqua
light aqua

1D-2

Note locations of two periods.

FRONT

(Specimen reported to exist, example not available.)

1D-2A

BACK

'**STANDARD**' over Blot-out of '**CANADIAN PACIFIC RY CO**' on rear skirt.

FRONT

1D-2B

BACK

Blot-out of '**STANDARD**' on rear skirt.

FRONT

1D-2C

BACK

Blot-out of '**CNR**' on front.

FRONT

(Specimen reported to exist, example not available.)

1D-2D

BACK

'**CNR**' blot-out on front,
'**STANDARD**' over blot-out of
'**CANADIAN PACIFIC**
RY CO' on rear.

FRONT

1D-2E

BACK

'**STANDARD**' not blotted out.

FRONT

(Specimen reported to exist, example not available.)

1D-2F

BACK

1D-3

CANADIAN. PACIFIC. RY. CO

(note period locations)

1D-3E raised area between '**O**' and mold line.

The **1D-3**s are prehaps the most difficult of all the embossed CD 143s to identify. The markings are all very similar. Only a few molds have specific unique markings. Some of the examples documented here may have had the embossing engraved deeper during the production period of the mold. The **1D-3** insulators have been found with the 'early follower' and the 'improved follower'. They have also been found with a sloped-in base similar to the **1-C** style.

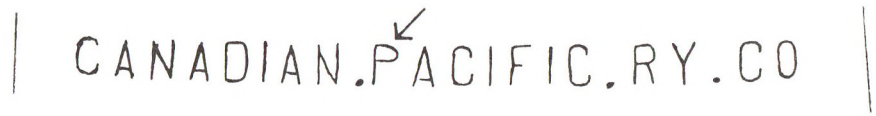
The 1D-3 **CANADIAN PACIFIC RY CO** insulators have been found in the following colours:

ice aqua	ice blue	light gray
light aqua	steel blue	light purple
aqua	gray blue	purple
green aqua	blue	royal purple
light green	clear	light yellow amber

light purple with purple swirls
steel blue with purple swirls
light aqua with white milk swirls

1D-3

Very tight '**P**' loop in '**PACIFIC**'.

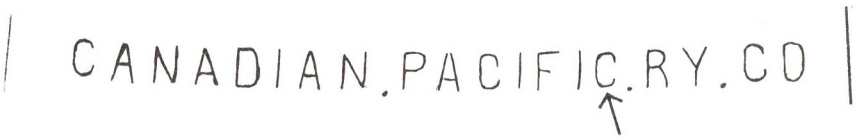


1D-3A

The '**A**' has a very faint crossbar, and the '**C**'s are large in '**PACIFIC**'.

1D-3B

All '**C**'s are small.



1D-3C

Uneven '**Y**' in '**RY**'

1D-3D

Raised area from the '**O**' in '**CO**' to the mold line.

1D-3E

Thin '**C**' in '**PACIFIC**', thin '**O**' in '**CO**'.	 **1D-3F**
High '**C**' in '**CANADIAN**'.	 **1D-3G**
Thin '**C**' and '**A**'s in '**CANADIAN**', uneven '**C**' bottom in '**PACIFIC**'.	 **1D-3H**

1D-4

CANADIAN PACIFIC. RY. CO.

(note locations of periods)

The **1D-4D** with thin lines through the embossing.

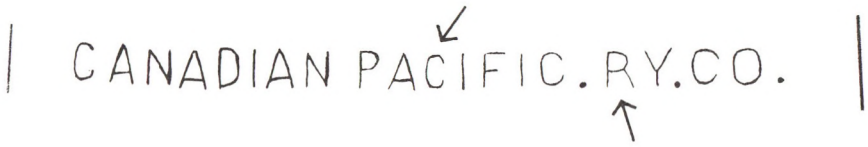
The **1D-4** insulators have been found with the 'early follower' and the 'improved follower'. They typically have very large lettering.

The 1D-4 **CANADIAN PACIFIC. RY. CO.** insulators have been found in the following colours:

ice aqua	ice blue	light gray
light aqua	steel blue	light purple
aqua	gray blue	purple
green aqua	blue	royal purple
light green	clear	light yellow amber

light purple with purple swirls
steel blue with purple swirls
light aqua with white milk swirls

1D-4

Raised area attached to the '**O**' and odd '**C**' in '**CO**'. Small '**R**' loop in '**RY**'.		**1D-4A**
Small '**C**' in '**PACIFIC**', small '**R**' in '**RY**'.		**1D-4B**
Very large letters.		**1D-4C**
Two thin lines through embossing, round '**D**', uneven '**C**'.		**1D-4D**
Tall thin '**C**' in '**PACIFIC**', small '**O**' in '**CO**'.		**1D-4E**

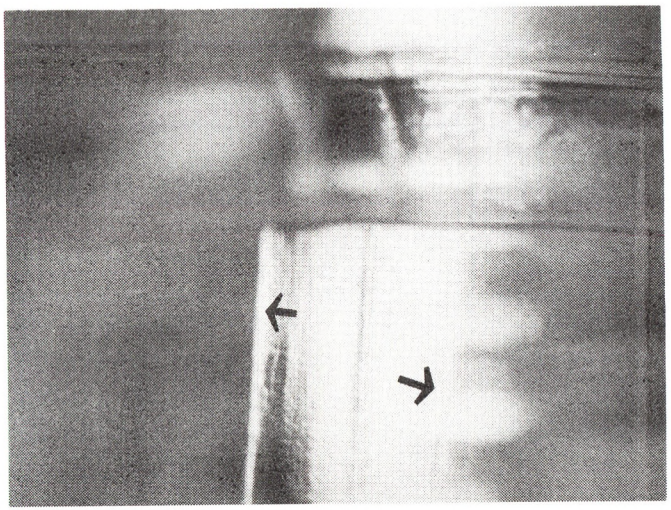
Engraved line attached to the
period in '**CO**',
thin '**D**' in '**CANADIAN**',
wide '**C**' in '**PACIFIC**'.

1D-4F

1D-5

CANADIAN. PACIFIC. RY. CO.

(note locations of periods)



Parallel lines near the mold lines indicate mold re-working.

The **1D-5** insulators all seem to have been produced with the 'early follower' mold part, and are quite heavy, with lots of solid glass in the dome and below the threads. The mold lines on the skirt sides of each example show evidence of mold re-working. Both **1D-5** molds known have an engraved line from the period in '**CO**' to the mold line.

The 1D-5 **CANADIAN. PACIFIC. RY. CO.** insulators have been found in the following colours:

ice aqua
light aqua
aqua

1D-5A

Tall narrow '**D**' in
'**CANADIAN**',
tall narrow '**RY**'.

1D-5A

Smaller embossing than above,
and small '**C**' in '**PACIFIC**'.

1D-5B

1D-6
CNR
(small lettering)

1D-6

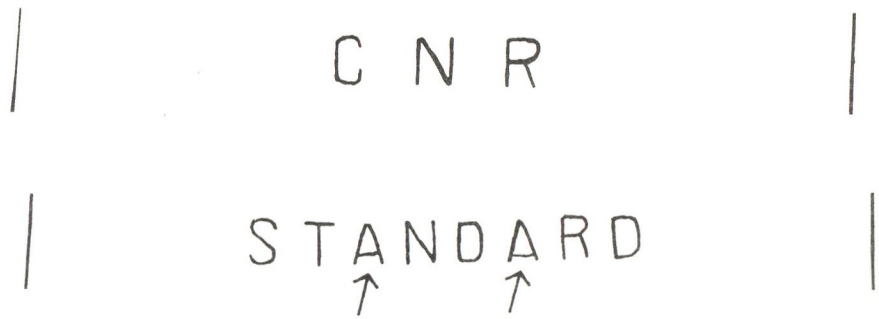
The **1D-6 CNR** insulators were made using the 'early follower' mold part. All examples found have '**STANDARD**' embossed on the rear skirt. They are dated starting at the time that the Canadian Northern Railway started its Telegraph division, in 1902.

The 1D-6 **CNR** insulators have been found in the following colours:

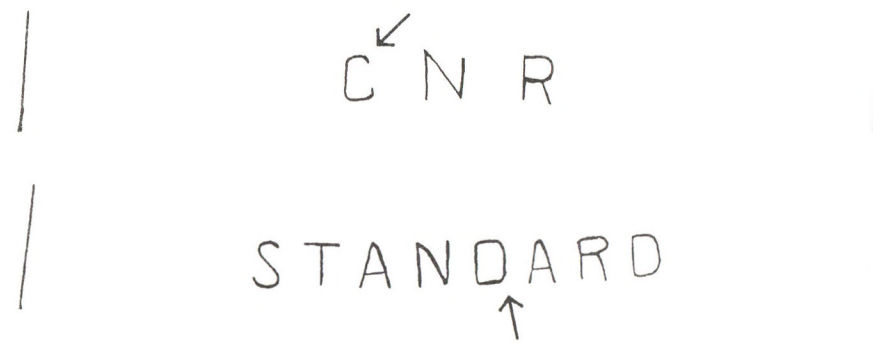
light aqua
aqua

Narrow '**A**' in '**STANDARD**'.

Low '**A**' crossbars in '**STANDARD**'.



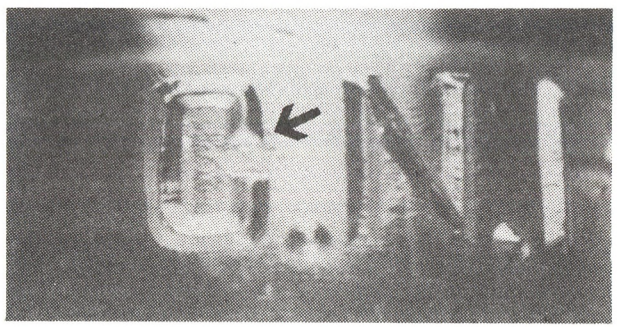
Uneven '**C**' in '**CNR**', large square '**D**' in '**STANDARD**'.



1D-7

C.N.R

(1/2" lettering)

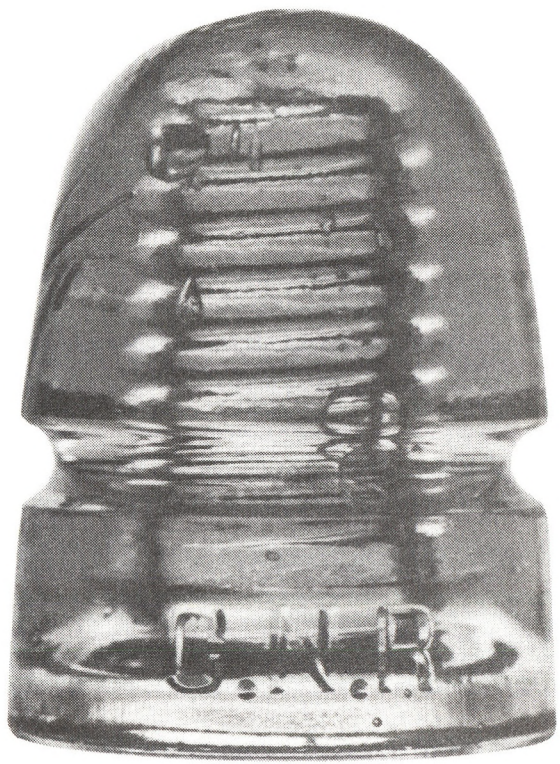


C.N.R over a small **CNR** blot-out.

The **1D-7 C. N. R** insulators all have evidence that the molds were used previously with different markings. All appear to have been produced with the 'early follower'.

The 1D-7 **CNR** insulators have been found in the following colours:

light aqua
light blue
steel blue
gray green
light purple
dark purple



1D- 7

'**STANDARD**'
over blot-out of
'**CANADIAN**
PACIFIC RY CO'

FRONT

1D-7A

BACK

'**CNR**' over blot-out
of small '**CNR**'.

FRONT

1D-7B

BACK

'**STANDARD**' over
large '**CNR**' blot-out.
Crooked '**S**' in '**STANDARD**'.

FRONT

1D-7C

BACK

'**STANDARD**' over large '**CNR**' blot-out, straight '**R**' leg in '**STANDARD**'.

FRONT

1D-7D

BACK

'**C.N.R**' over large '**CNR**' blot-out, '**STANDARD**' over '**CANADIAN PACIFIC RY CO**' blot-out.

(specimen reported to exist, example not available)

FRONT

1D-7E

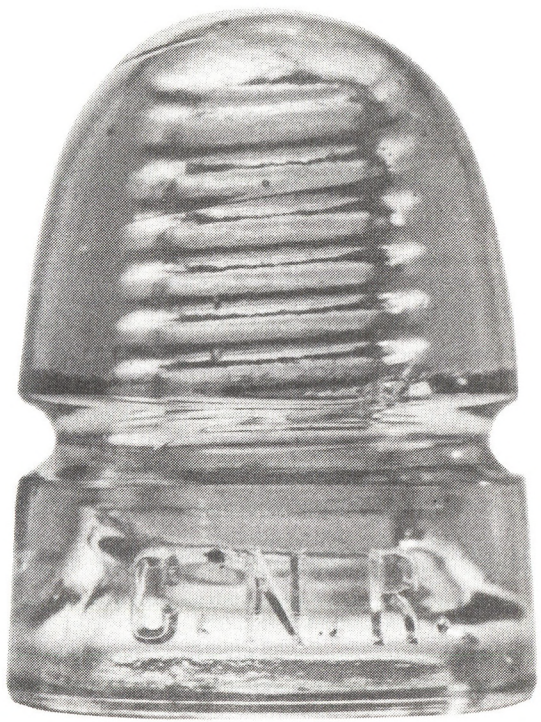
BACK

1D-8

C.N.R.

(large lettering)

The best way to identify the **1D-8** molds is by looking closely at the '**R**' in '**C.N.R.**'. Each mold has a unique '**R**', usually identified by the length and curve of the leg, and its distance from the straight leg on the left of the '**R**'. These insulators all appear to have been made using the 'early follower' mold part, and also date from the 1902 period.



1D-8

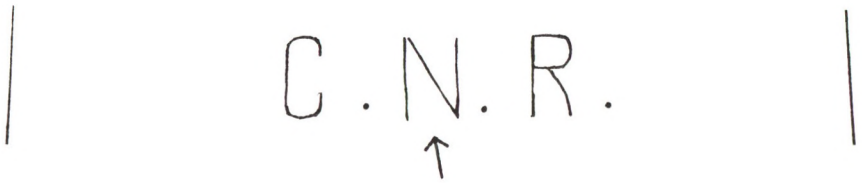
The 1D-8 **C.N.R.** insulators have been found in the following colours:

light aqua
aqua
steel blue
blue gray
green aqua
purple tint
light purple
dark purple

Uneven '**C**'.

1D-8A

Wide '**N**'.



1D-8B

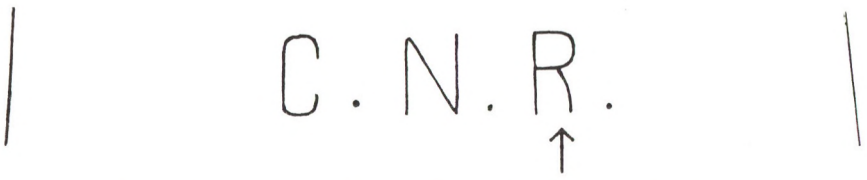
Tight curve on bottom of '**C**',
almost no curve in '**R**' leg.

1D-8C

Wide '**R**' at bottom.

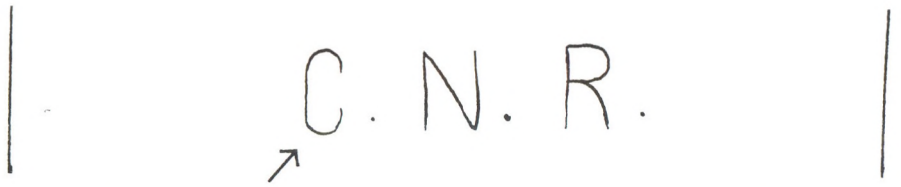
1D-8D

Narrow '**R**' at bottom.



1D-8E

Rounded '**C**'.



1D-8F

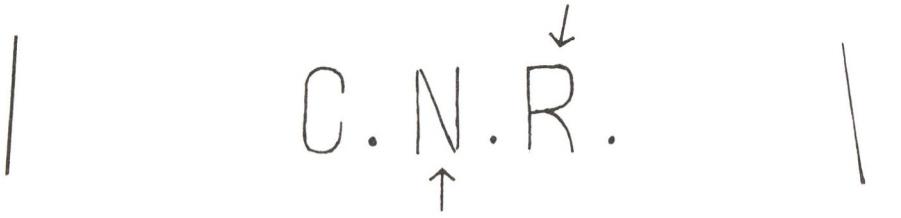
Narrow '**R**'.

1D-8G

Low '**R**' leg.

1D-8H

Sharp rim,
narrow '**N**',
wide '**R**'.



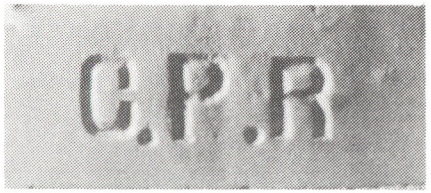
FRONT

1D-8 I

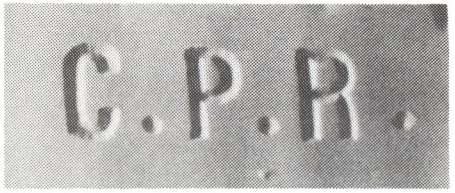
BACK

1D-9

C.P.R
C.P.R.
(note periods)



C.P.R with the '**P**' over an '**N**'.



Larger **C.P.R.** with three periods.

Most of the **1D-9 C.P.R** and **C.P.R.** insulators were produced from re-worked '**C.N.R.**' and '**CANADIAN PACIFIC RY CO**' molds, and contain numerous different embossing erasures. Two separate styles of markings are combined within the **1D-9** group. The first '**C.P.R**' marking was a '**C.N.R**' mold, with the '**N**' in '**C.N.R**' changed to a '**P**'. The second style has a larger '**C.P.R.**' marking, with all three periods.

The 1D-9 **C.P.R** insulators have been found in the following colours:

light aqua
aqua
light blue
steel blue
blue gray
light purple

'**P**' over blot-out of '**N**',
'**STANDARD**' over
blot-out of large '**CNR**'.

FRONT

1D-9A

BACK

'**P**' over blot-out of '**N**',

'**STANDARD**' over blot-out
of '**CANADIAN
PACIFIC RY CO**'.

FRONT

1D-9B

BACK

Extended '**P**' loop,
'**P**' over blot-out of '**N**',

'**STANDARD**' over blot-out
of '**CANADIAN
PACIFIC RY CO**'.

FRONT

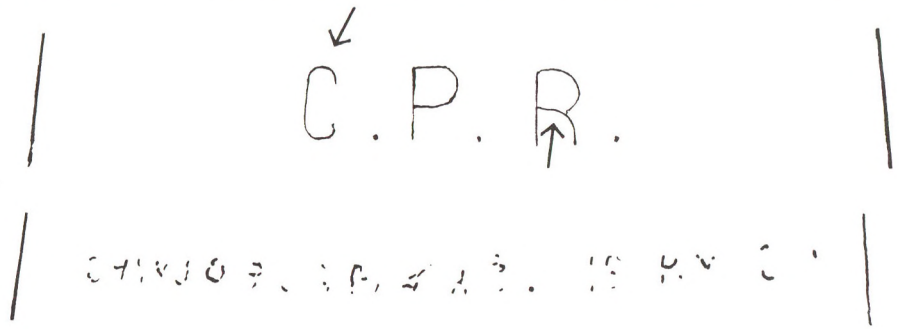
1D-9C

BACK

Narrow '**C**', tilted '**R**'.

Blot-out of '**CANADIAN PACIFIC RY CO**'.

3 periods in '**C.P.R.**'



FRONT

1D-9D

BACK

Short '**P**' leg, straight '**R**' leg.

3 periods in '**C.P.R.**'

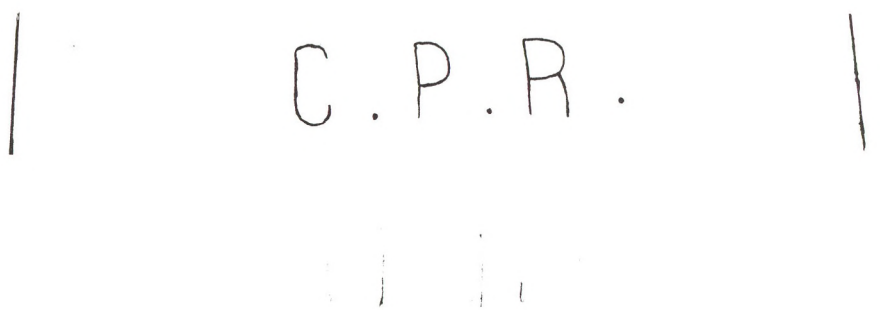
FRONT

1D-9E

BACK

Blot-out of large '**CNR**' on rear.

3 periods in '**C.P.R.**'



FRONT

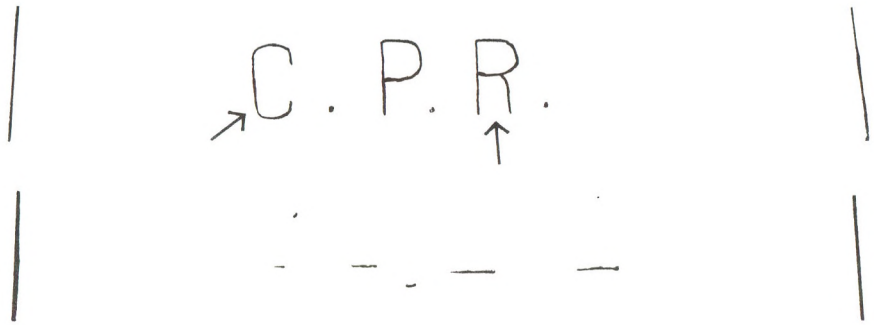
1D-9F

BACK

Tilted '**C**', narrow '**R**' legs.

Horizontal dashes
(blot-out of large '**CNR**')

3 periods in '**C.P.R.**'



FRONT

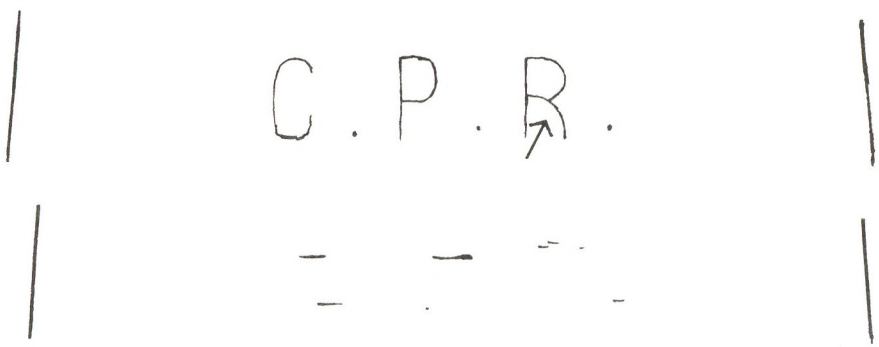
1D-9G

BACK

Curved leg on '**R**'.

Horizontal dashes
(blot-out of large '**CNR**')

3 periods in '**C.P.R.**'



FRONT

1D-9H

BACK

1D-10
G.N.R.

The **1D-10** insulators were all made using the 'early follower' mold part, and often have the typical vertical scraping lines on the inside of the skirt. The embossing is 'chisel point' style, with large raised letters. The **1D-10** and **1D-11** insulators have been roughly dated around 1920, based on blot-outs.

The 1D-10 **G.N.R.** insulators have been found in the following colours:

light aqua	steel blue
aqua	light purple
gray	

1D-10

'**GNR**' over blot-out
of small '**CNR**',
wide '**R**' in '**GNR**'.

FRONT

1D-10A

BACK

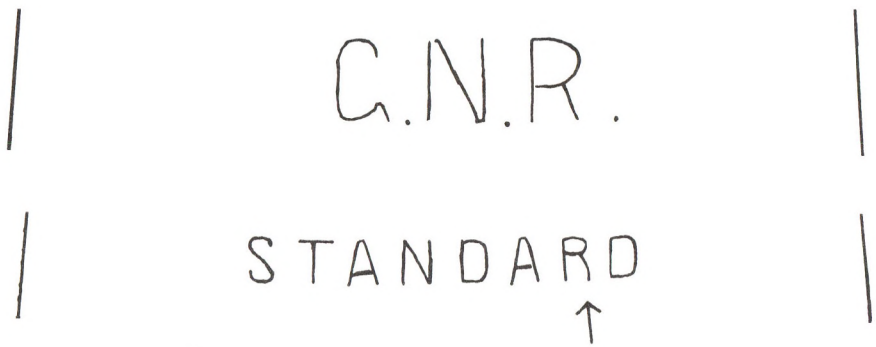
'**GNR**' over blot-out
of small '**CNR**',
narrow '**R**' in '**GNR**'.

FRONT

1D-10B

BACK

Curved '**R**' leg in
'**STANDARD**'.



FRONT

1D-10C

BACK

1D-11
G.P.R.

1D-11 'chisel point' embossing
with blot-out of small '**CNR**' and large '**GNR**'.

1D-11

The **1D-11 G.P.R.** insulators were made from molds previously used for **C.N.R.** insulator production. The 'early follower' was used, and vertical scraping lines can be found on the inside skirts of these insulators. These specimens also have large 'chisel point' embossing on the front skirt.

The 1D-11 **G.P.R.** insulators have been found in the following colours:

light aqua
aqua
steel blue
light purple

'**P**' over '**N**', '**GPR**' over blot-out of small '**CNR**'.

'**STANDARD**' over blot-out of large '**CNR**'.

FRONT

1D-11A

BACK

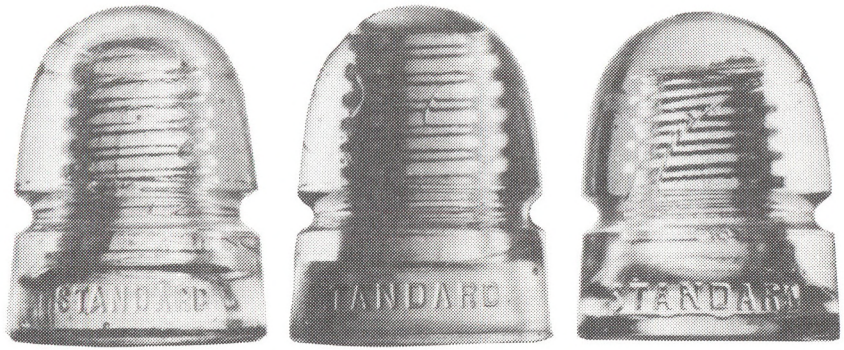
'**P**' over '**N**', '**GPR**' over blot-out of small '**CNR**'.
No period after '**G**' in '**GPR**'.

FRONT

1D-11B

BACK

1D-12
STANDARD



An example of the various **1D-12** molds.

The **1D-12** '**STANDARD**' insulators have been found in both the 'early follower' style and the 'improved follower style. Many of the molds found embossed with '**STANDARD**' have embossing blot-outs of other railway markings.

The 1D-12 **STANDARD** insulators have been found in the following colours:

ice aqua	purple	green
light aqua	royal purple	
green aqua	steel blue	
gray green	steel blue	
off-clear	olive green blackglass	
light purple	blue aqua	
gray	light aqua with milk swirls	

1D-12

Narrow word length.		**1D-12A**
Wide word length.		**1D-12B**
Narrow '**S**' and '**D**'.		**1D-12C**
Wide word length, wide '**S**', square '**D**'.		**1D-12D**
Wide word length, uneven '**S**', wide '**D**'.		**1D-12E**

'**STANDARD**' over blot-out of '**CANADIAN PACIFIC RY CO**'.

1D-12F

STANDARD' over blot-out of '**CANADIAN PACIFIC RY CO**'.

1D-12G

STANDARD' over blot-out of '**CANADIAN PACIFIC RY CO**'.

1D-12H

Blot out of large '**CNR**'. (May be '**C.P.R.**')

FRONT

1D-12 I

BACK

Blot-out of small '**CNR**'.

FRONT

1D-12J

BACK

'**STANDARD**' over blot-out
of large '**CNR**'.

FRONT

1D-12K

BACK

'**STANDARD**' over blot-out
of large '**CNR**',
large '**CNR**' blot-out on rear.

(Specimen reported to exist, example not available.)

FRONT

1D-12L

BACK

'**STANDARD**' over blot out of
'**CANADIAN PACIFIC RY CO**',

FRONT

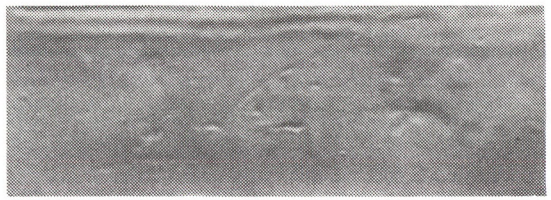
(Specimen reported to exist, example not available.)

1D-12M

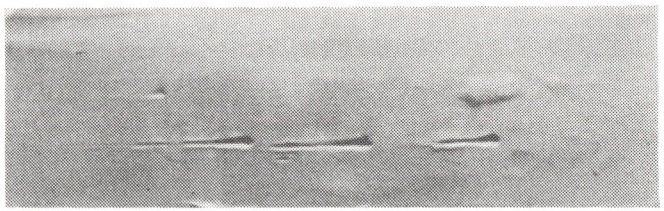
'**C.N.R.**' blot out on rear.

BACK

1D-13
(VARIOUS ERASURES)



1D-13E blot-out of **C.N.R.**

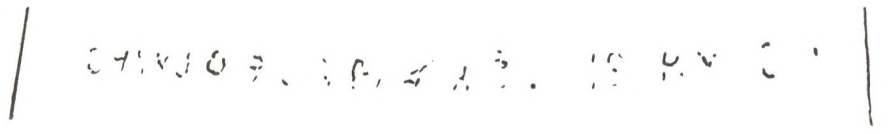


1D-13B horizontal dashes as blot-out of **C.N.R.**

The **1D-13** grouping of insulators are 1D specimens that have no significant marking, but that all contain erasures of previous railway markings.

The **1D-13** insulators have been found in the following colours:

light aqua
aqua
light blue
blue aqua

High horizontal dashes. (Blot-out of large '**CNR**'.)		**1D-13A**
Medium height horizontal dashes. (Blot-out of large '**CNR**'.)		**1D-13B**
Low horizontal dashes. (Blot-out of large '**CNR**'.)		**1D-13C**
Blot-out of '**CANADIAN PACIFIC RY CO**'.		**1D-13D**
Very faint erasure of large '**CNR**'.		**1D-13E**

Blot-out of large '**CNR**',
blot-out of large '**CPR**' on rear.

FRONT

(Specimen reported to exist, example not available.)

1D-13-F

BACK

Blot-out of small "**CNR**',
blot-out of '**STANDARD**' on rear.

FRONT

(Specimen reported to exist, example not available.)

1D-13-G

BACK

Blot-out of '**CANADIAN
PACIFIC RY CO**', blot-out of
'**STANDARD**' on rear.

FRONT

(Specimen reported to exist, example not available.)

1D-13H

BACK

FRONT

(NO EMBOSSING)

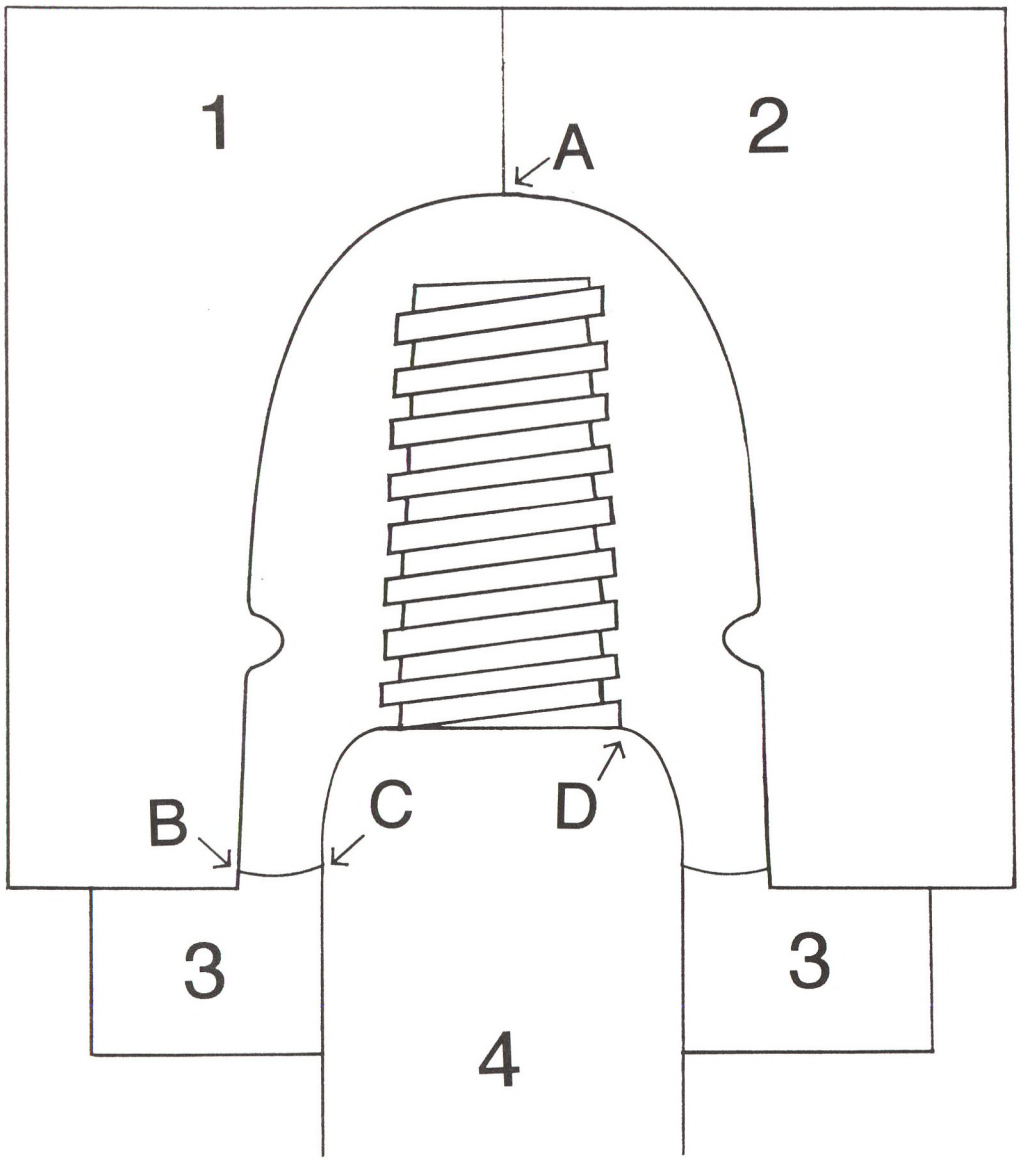
1D-13-I

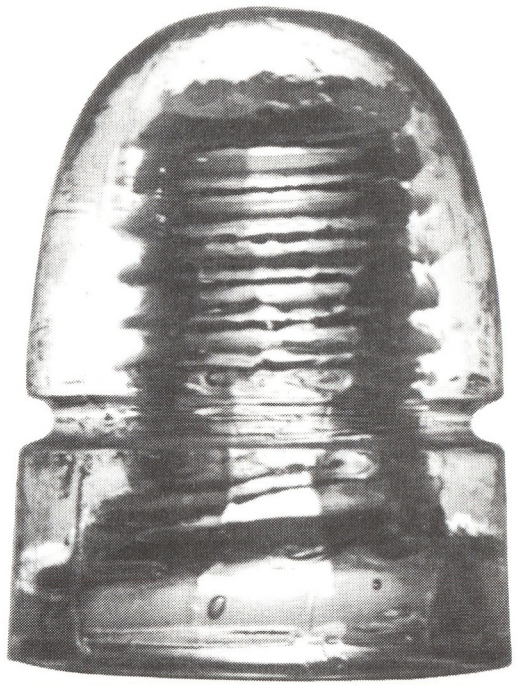
BACK

1-E

(UNMARKED)

CD-143





1E

1-E

(UNMARKED)

CD-143

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

The 1Es have a mold line over the dome and a swirl start to the threads. This style has a "whittled" appearance on the outer surface. Two different molds produced these 'whittle mold' insulators. These pieces have been roughly dated from 1880 to 1890.

The 1E "whittle mold" insulators have been found in the following colours:

light gray	green
light gray green	blue
light purple	smoke
aqua	sage green

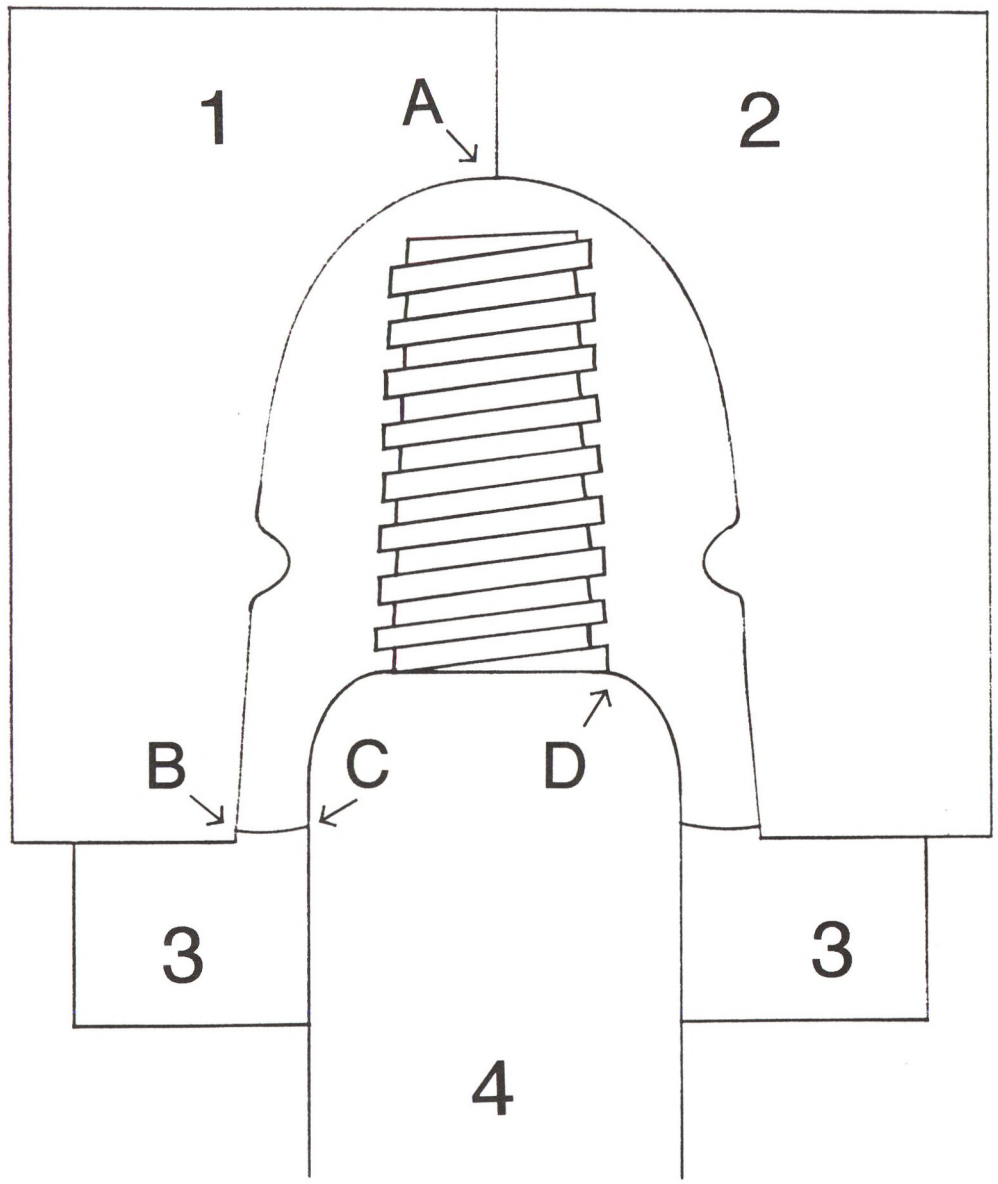
1E-1

One of the 'whittle' molds has this marking on one skirt side. It appears on both shallow and deep 'whittled' surfaces, indicating that these two molds eroded during use.

1-F

(UNMARKED)

CD-143



1-F

1-F

(UNMARKED)

CD-143

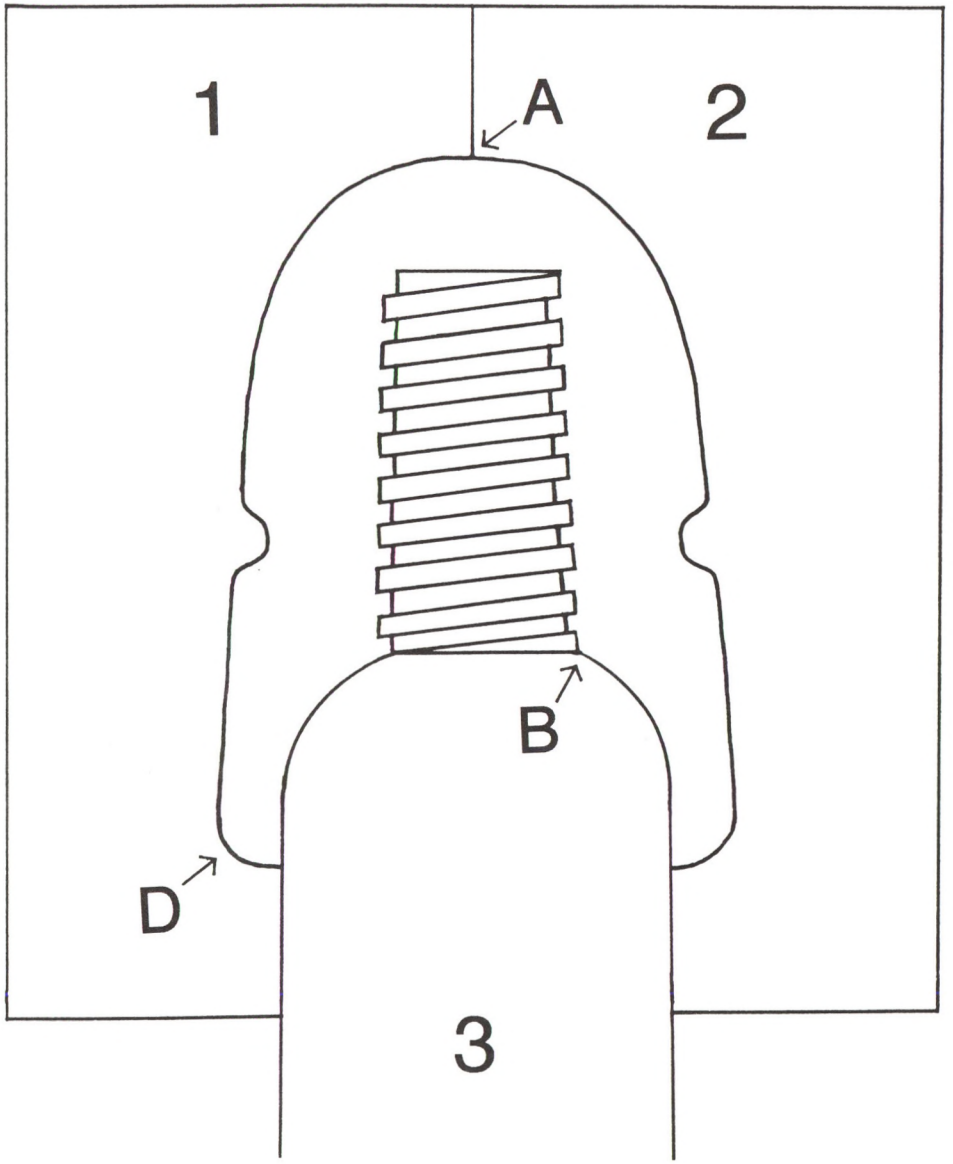
The 1F unmarked and the 1B unmarked.
Both have thin skirt sides, but the 1F has a smaller profile .

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

The 1Fs have a mold line over the dome and a swirl start to the threads. The skirt sides are very thin, and the insulator has a short appearance

The 1F insulators have been found in thefollowing colours:

aqua
green aqua



2-A

CANADIAN PACIFIC RY CO
and *(UNMARKED)*

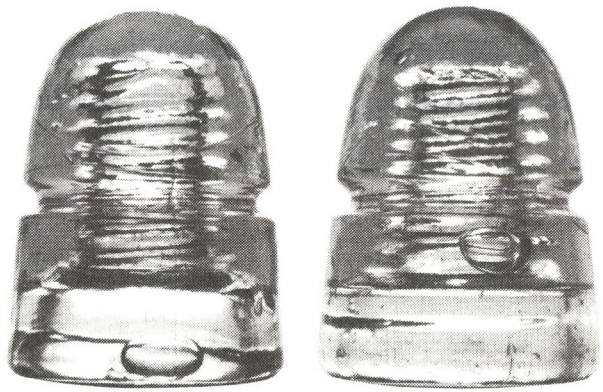
CD-143

2A3A

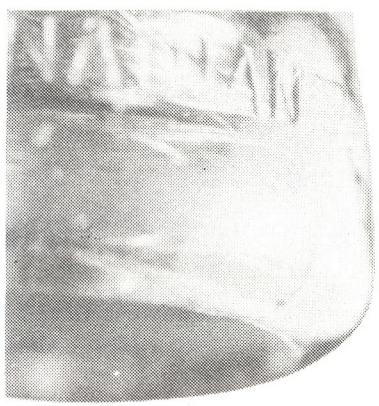
2-A

CANADIAN PACIFIC RY CO
and *(UNMARKED)*

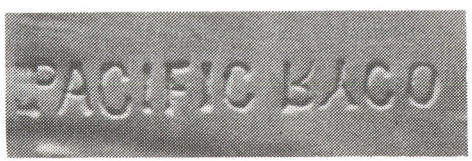
CD-143



2A unmarked and 2C unmarked.



2A base feature



2A3A upside-down '**RY**'

The absence of a pinch point at '**D**', and a mold line across the base, indicate that there was no top plate in this mold design. The mold parts **1** and **2** that formed the sides of the insulator also formed the base. The absence of a pinch point at '**B**' and swirl-start to the threads indicates that the plunger (mold part **3**) also formed the inside of the skirt. A mold line at point 'A' indicates the use of a two-piece mold.

This is the mold style that can be found with the upside-down 'RY' on some items. It also has been found unmarked. The unmarked 2A is easily confused with the unmarked 2C. This type 2 style, with the round base, has been roughly dated at 1892.

The 2A **CANADIAN PACIFIC RY CO** and **unmarked** have been found in the following colours:

light aqua	light green	light olive green
aqua	green	dark yellow green
light blue	light yellow green	
blue	light lime green	

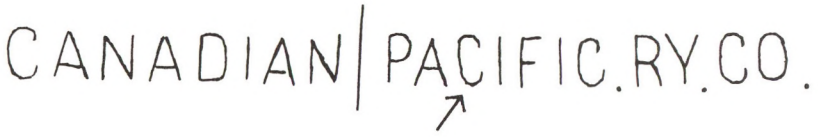
Small "**ANA**" and small crooked "**F**" bar.

2A-1A

The "**PA**" in "PACIFIC" is tilted to the top left.

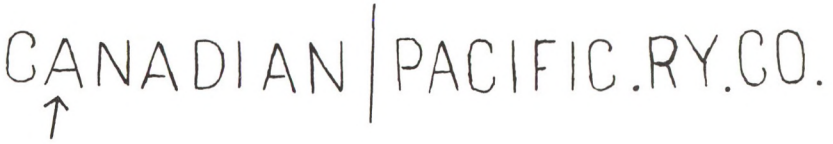
2A-1B

Uneven "**C**" in "PACIFIC" note periods.



2A-2A

Higher crossbar in the first "**A**" in "CANADIAN" note periods.



2A-2B

Short "**R**" in "RY"
note periods.

2A-2C

Upside down "**RY**".

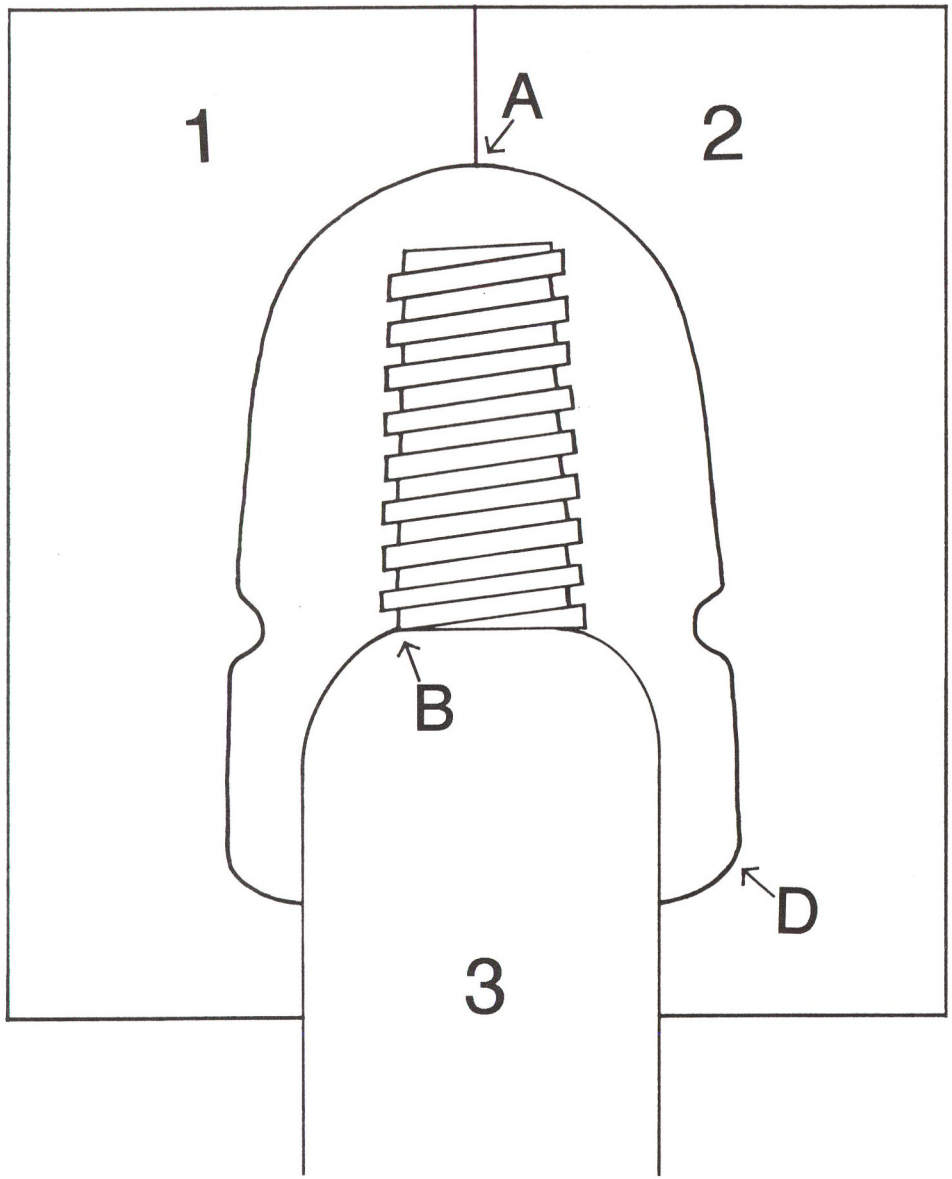
2A-3A

"RY" partially corrected.
(2A3A mold revision)

2A-3B

(NO EMBOSSING)

2A-4A



2-B

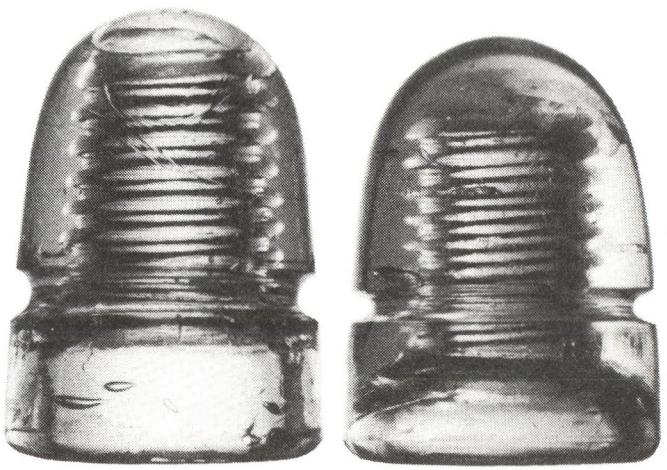
CANADIAN PACIFIC RY CO
and *(UNMARKED)*

CD-143

2B1A

2-B

CANADIAN PACIFIC RY CO
and *(UNMARKED)*



2B unmarked and 2B slumped

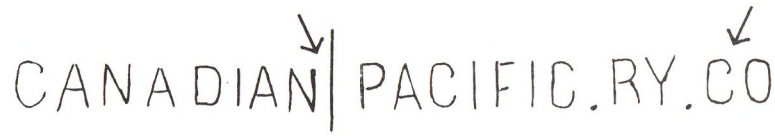
The absence of a pinch point at '**D**', and a mold line across the base indicate that there was no top plate in this mold design. The mold parts '**1**' and '**2**' that formed the sides of the insulator also formed the base. The absence of a pinch point at '**B**' and swirl-start to the threads indicate that the plunger (mold part **3**) also formed the inside of the skirt. A mold line at point '**A**' indicates the use of a two-piece mold.

The 2B mold style is similar to the 2A, except the wire groove is lower. The unmarked 2B is sometimes found slumped, with a pinched wire groove. This style also dates to the 1892 period.

The 2B **CANADIAN PACIFIC RY CO** and **unmarked** insulators have been found in the following colours:

green aqua
aqua
blue aqua
blue

"**CANADIAN**" is closer to the mold line than 2B-1B, and the "**C**" in "**CO**" has a curled top.



2B-1A

Larger lettering in "**CANADIAN**", wide space between "**N**" and the mold line.

2B-1B

Small '**Y**' leg, uneven '**C**' bottoms.

2B-1C

Several letters are similar to those in 2B-1A. This could be an earlier engraving of the 2B-1A mold.

2B-1D

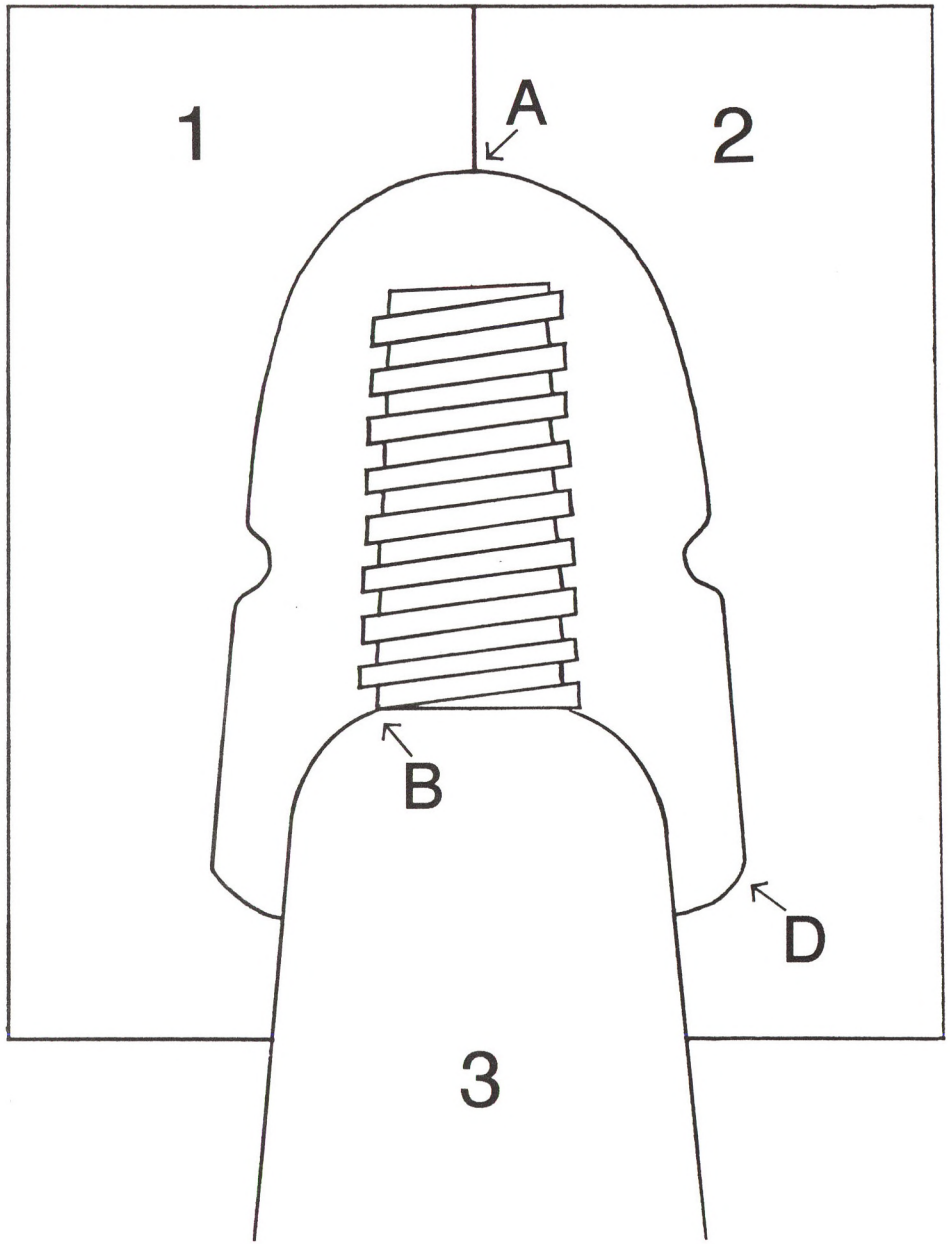
(NO EMBOSSING)

2B-2A

2-C

(UNMARKED)

CD-143

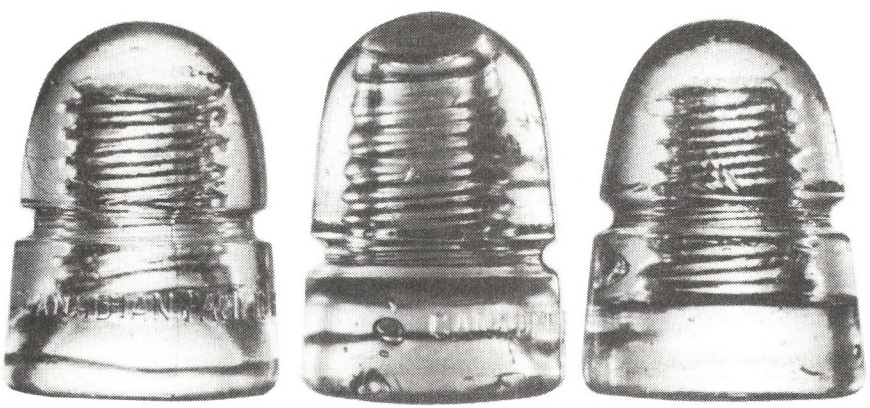


2C

2-C

(unmarked)

CD-143



2A **2B** **2C**

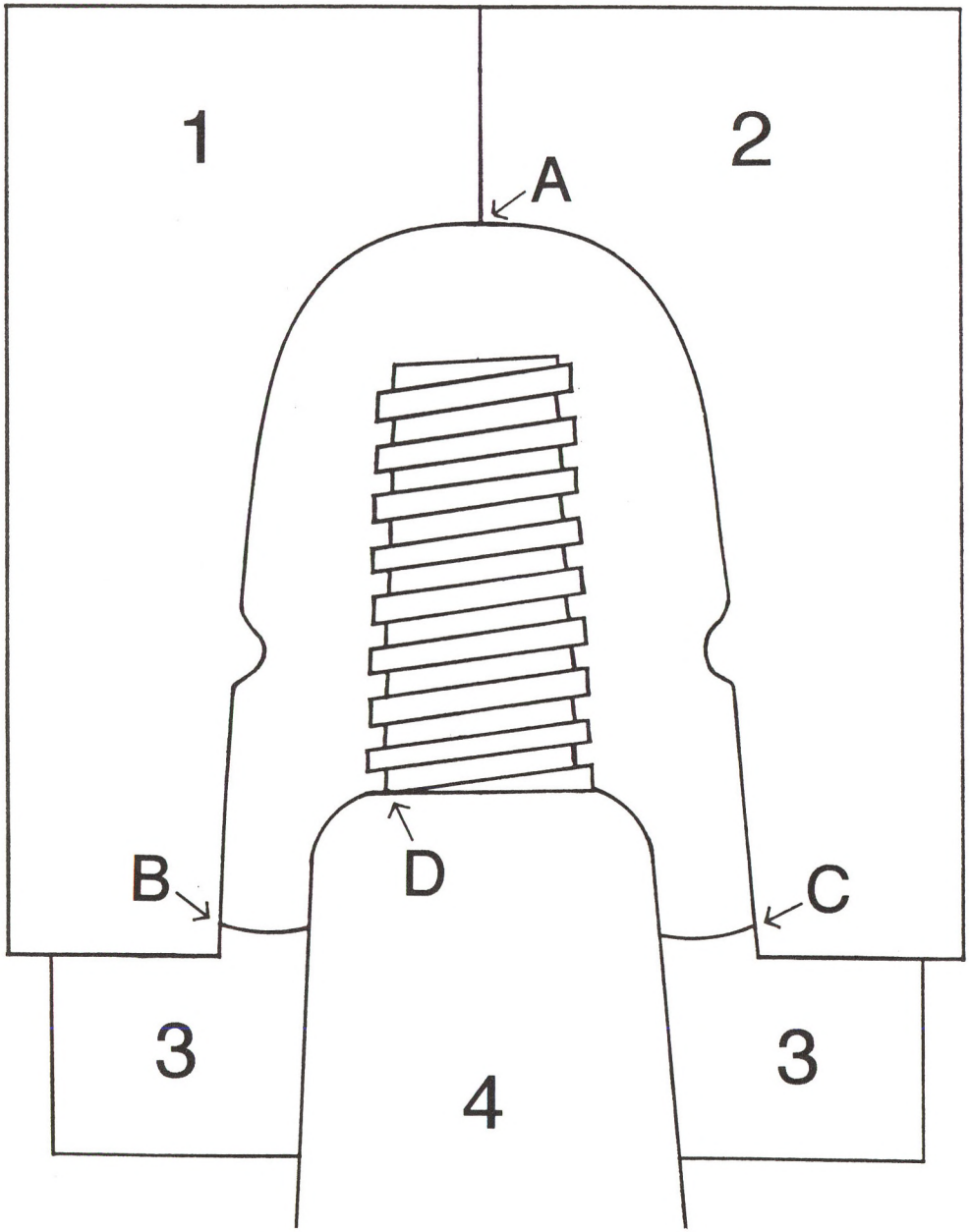
The three profiles of the type 2 molds. **2C** has a high wire groove and pointed dome.

The absence of a pinch point at '**D**', and a mold line across the base, indicate that there was no top plate in this mold design. The mold parts **1** and **2** that formed the sides of the insulator also formed the base. The absence of a pinch point at '**B**' and swirl-start to the threads indicates that the plunger (mold part **3**) also formed the inside of the skirt. A mold line at point '**A**' indicates the use of a two-piece mold.

The 2Cs have the same features as the 2As and the 2Bs, but have a thinner, pointed dome top and high wire groove. They would also date from the same 1892 period.

The 2Cs are all unmarked, and come in a wider range of colours than the 2As and the 2Bs:

off clear
gray
light purple
purple
light yellow green
light aqua
aqua
light blue
blue
dark olive green
dark sky blue



3-A / 3-B

MONTREAL TELEGRAPH CO
and *(UNMARKED)*

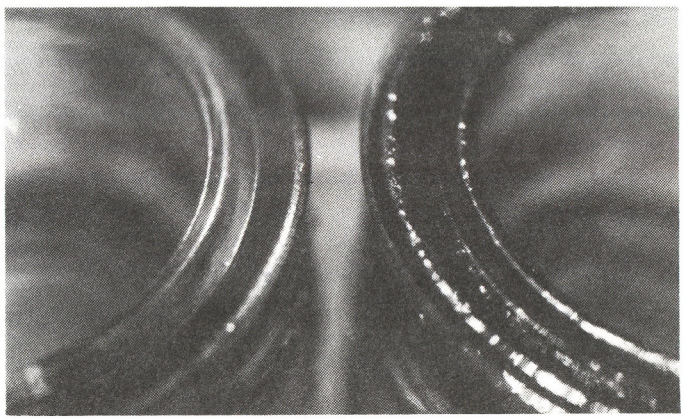
CD-143

3A1B

3-A / 3-B

MONTREAL TELEGRAPH and *(UNMARKED)*

CD-143



Two different styles of the 3B grooved base.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the the portion of the mold part '**3**' (top plate) that forms the base. There is swirl-start to the threads and no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a two piece mold.

The two known embossed molds are found with both a smooth base and two different styles of grooved base. The unmarked specimens have a smooth base. These insulators have been roughly dated at 1868 to 1880, with the grooved base style possibly appearing after H.P. Dwight became superintendent of the Montreal Telegraph Company in 1878.

Mold line splits embossing
on one **3A** and **3B** mold.

The 3A and 3B **MONTREAL TELEGRAPH CO.** and **unmarked** insulators have been found in the following colours:

aqua	green aqua
blue	green
bright blue	dark olive green

Embossing
on one side of mold.
Normal base.

3A-1A

Embossing split by mold line.

Normal base.

3A-1B

(Unmarked)

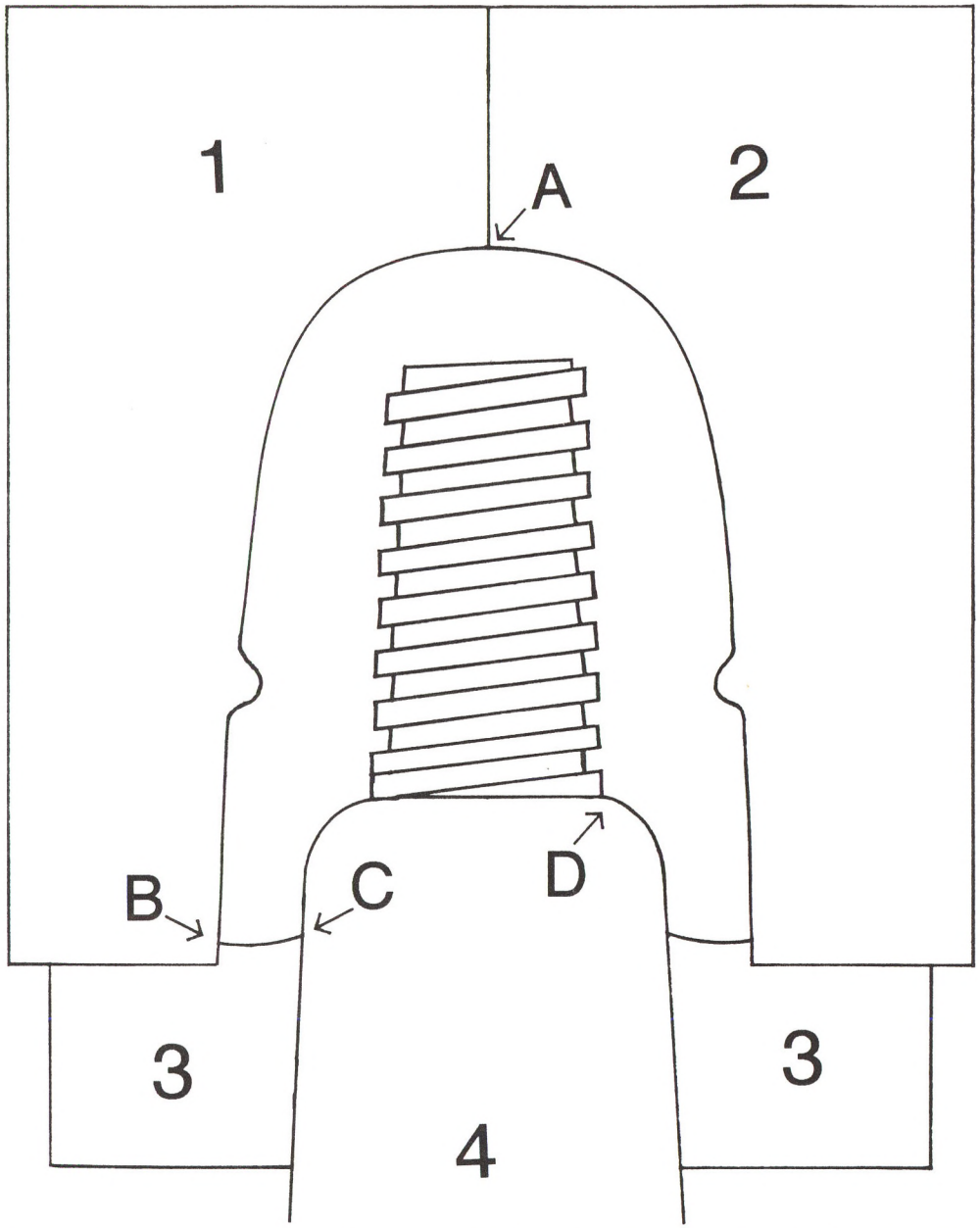
3A-2A

Embossing all on one side of mold. Grooved base.	| MONTREAL TELEGRAPH CO |	**3B-2A**
Embossing split by mold line. Grooved base.	| MONTREAL TELEGRAPH | CO	**3B-2B**

3-C

CANADIAN PACIFIC RY

CD-143



3C2A

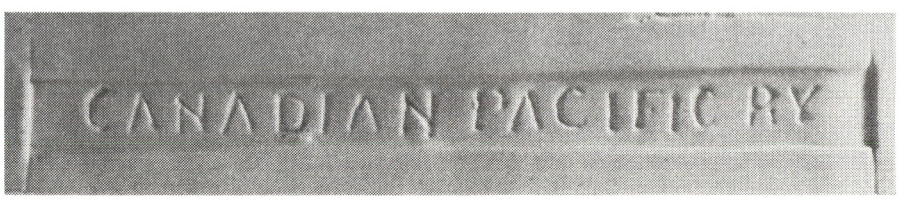
3-C

CANADIAN PACIFIC RY

CD-143

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a two piece mold.

The 3C insulators all have a swirl-start to the threads. One mold half has been re-machined to remove an earlier embossing. The new embossing is engraved into this band. They have been roughly dated from 1880 to 1883.

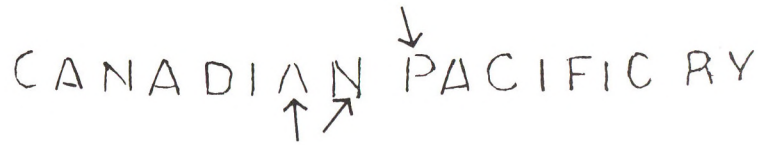


The raised band of the 3C mold style.

The 3C **CANADIAN PACIFIC RY** insulators have been found in the following colours:

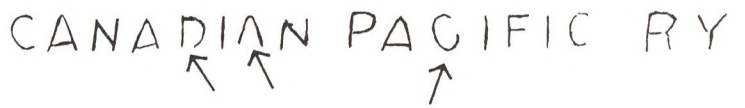
light aqua	teal green
aqua	light blue
light green	blue
green	dark yellow green

Missing "**A**" cross bar, high "**N**" bar in "**CANADIAN**", incomplete "**P**" in "**PACIFIC**".



3C-1A

Incomplete "**D**" and missing "**A**" cross bar in "**CANADIAN**", crooked "**C**" in "**PACIFIC**".

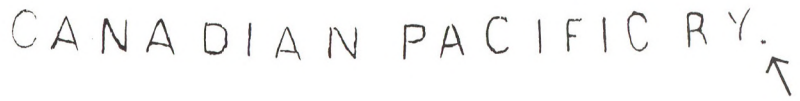


3C-1B

Very thin "**R**" in "**RY**".

3C-2A

Wide embossing, period after "**RY**".



3C-2B

Blot-out or worn out
embossing of 3C2A.

3C-2C

Raised band blot-out
ends before the mold lines.

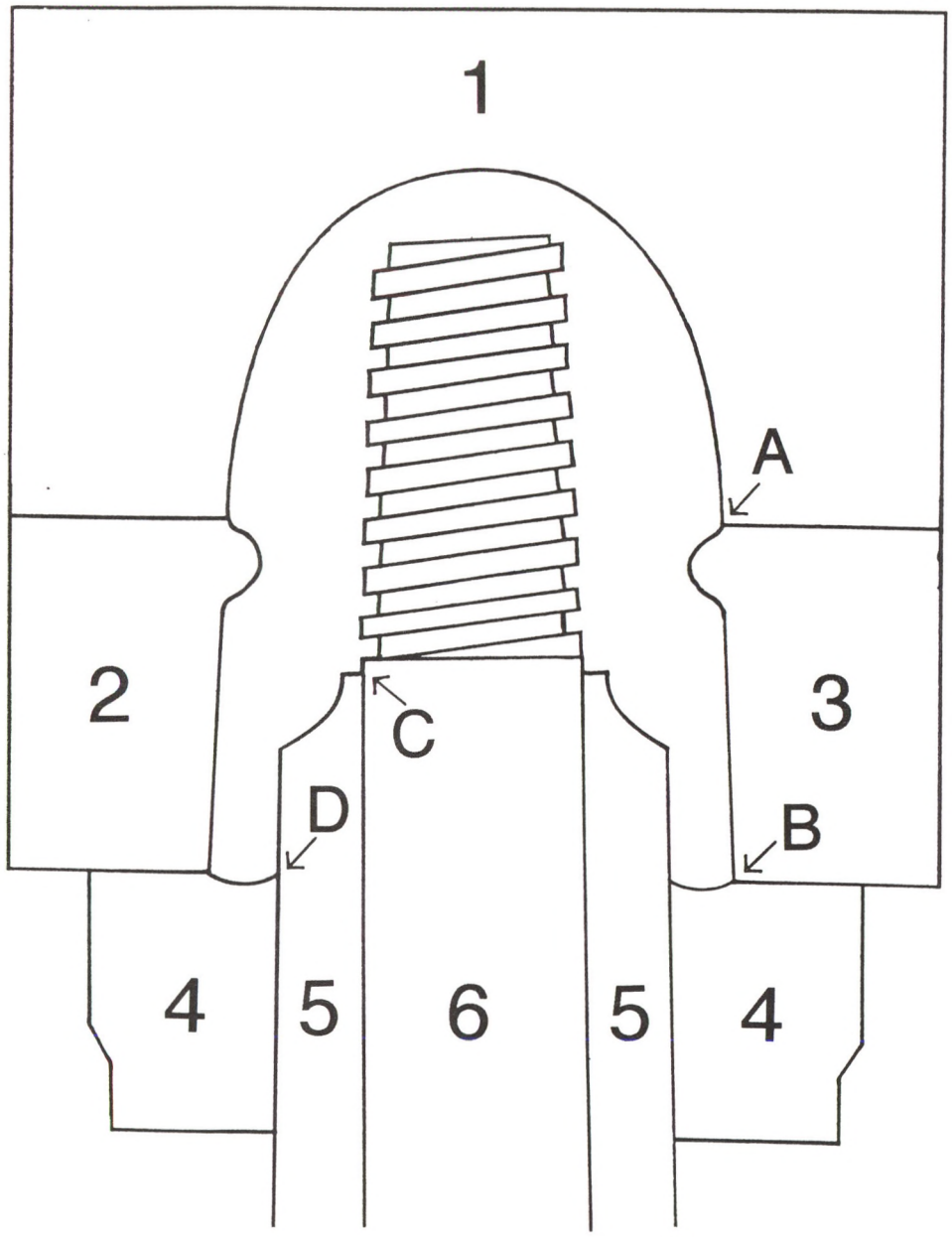
(Specimen reported to exist, example not available.)

3C-3A

4

C.N.R.

CD-143



4A1A

4

C.N.R.

The type 4 embossings are difficult to describe, so photographs of each embossing are included in the following listing. The best way to identify individual markings is to look at the width of the **C**s and the shape of the **R** leg.

Four times actual size.

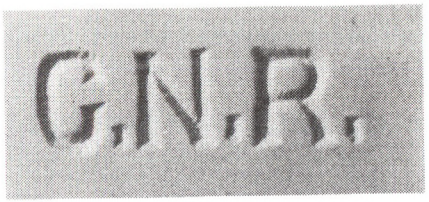
thin 'O' found on the rear skirt of 4A3A

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The skirt mold parts meet the main mold body at point '**A**', and extend to the top plate at point '**B**'. The pinch point at '**C**' indicates that the plunger (mold part **6**) did not form the inside of the skirt. As the top plate and the follower would be stationary during the pressing action of the plunger, the insertion of the plunger would produce another pinch point at '**D**' as it forced glass up into the base. No swirls or elongated bubbles in the glass near the threads indicate that the plunger did not rotate on insertion.

The type 4 molds are more modern three-piece molds and have no mold line over the dome. All the type 4 molds are marked with large 'chisel point' embossing. The type 4 insulators have been dated from 1920 to 1931, starting when Canadian Northern Telegraph Co. became the Canadian National Telegraph Co.

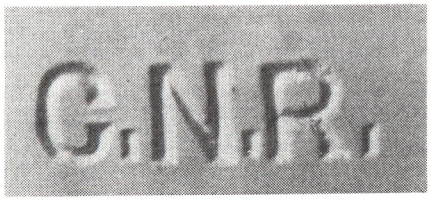
The type 4 **C.N.R.** insulators have been found in the following colours:

aqua
aqua with green swirls
blue
blue aqua
green
yellow green
yellow green with darker swirls



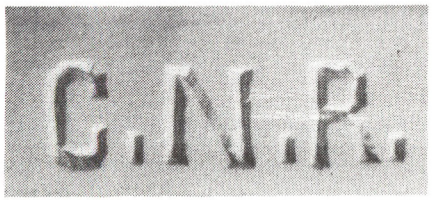
C.N.R.

4A-1A



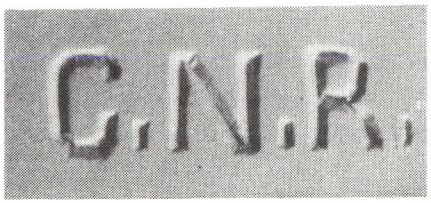
C.N.R.

4A-1B



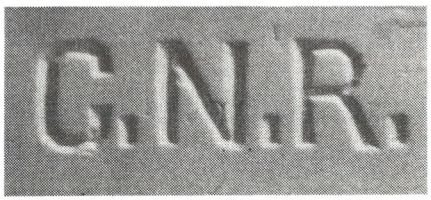
C.N.R.

4A-2A



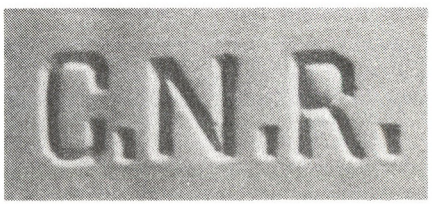
C.N.R.

4A-2B



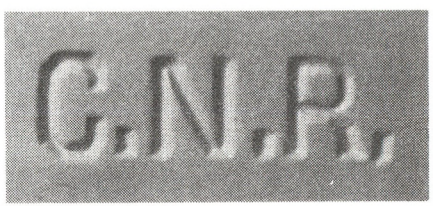
C.N.R.

4A-2C



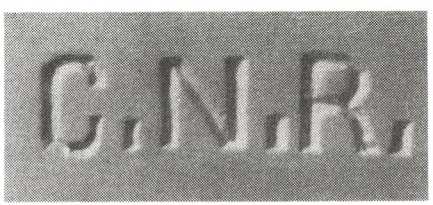
C.N.R.

4A-2D



C.N.R.

4A-2E



C.N.R.

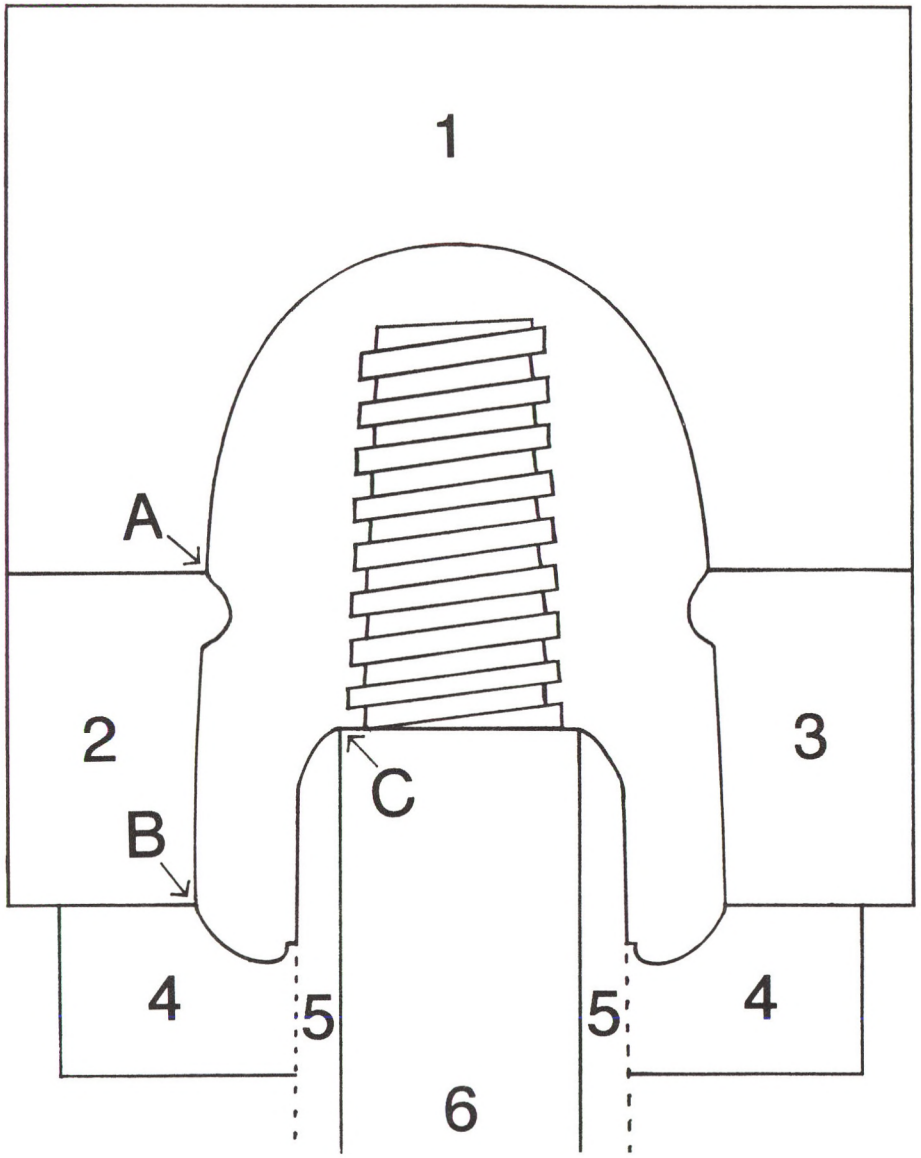
4A-3A

Very faint "**O**" on rear skirt.

5-A

G.N.W. DWIGHT
DWIGHT

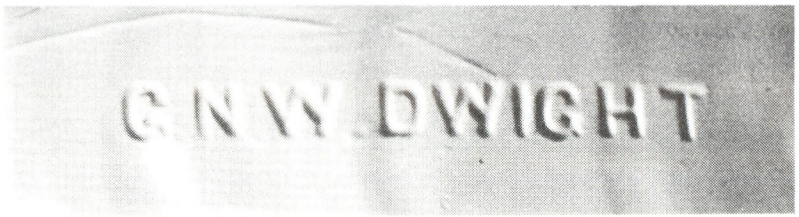
CD-143



5-A

G.N.W. DWIGHT
DWIGHT

CD-143



5A1A with **'G.N.W.'** embossing.

There are 8 known type 5A molds, each with embossing erasures for a total of 16 possible varieties. Listings have been added to the numbering system to accomodate 'G.N.W.' marked specimens where only the 'G.N.W.' erased versions have been found to date.

The type 5A insulators have been divided into the following sub-groups:

5A**1** (A,B,C,D,E,F,G,H) include markings with the **'W'** in DWIGHT as illustrated below, with offset center bars:

5A**2** (A,B) include markings with only one side of the **'W'** offset:

5A**3** (A,B,C,D,E,F) molds were engraved with a regular **'W'**:

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts **'2'** and **'3'** formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The skirt mold parts meet the main mold body at point **'A'**, and extend to the top plate at point **'B'**. The pinch point at **'C'** indicates that the plunger (mold part **6**) did not form the inside of the skirt. No swirls or elongated bubbles in the glass near the threads indicate that the plunger did not rotate on insertion.

Type 5A insulators have a round base which was formed by a separate mold part, so was not formed the same way as the type 2 molds. The G.N.W. DWIGHT marking has been dated prior to 1905, when H.P. Dwight left G.N.W. The insulators with the G.N.W. removed would date from after 1905.

The 5A **G.N.W. DWIGHT** and **DWIGHT** insulators have been found in the following colours:

clear	light green	blue aqua
gray	green aqua	steel blue
light purple	aqua	
purple	light blue	

'**N**' in '**GNW**' has high bar.
Note unusual '**G**' hook.
The '**W**' has high crossbars.

G.N.W. DWIGHT

PATTERN

FRONT

5A-1A

BACK

'**G.N.W.**' blot-out.
Note unusual '**G**' hook.
The '**W**' has high crossbars.

(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this modified marking.)

FRONT

5A-1B

BACK

'**DWIGHT**' closer to right mold line.
'**PATTERN**' close to left mold line.
The '**W**' has high crossbars.

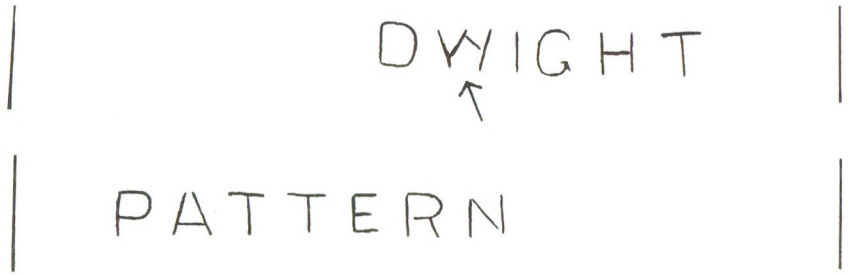
(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-1C

BACK

'**G.N.W.**' blot-out.
'**PATTERN**' closer
to left mold line.
'**DWIGHT**' closer
to right mold line.
The '**W**' has
high crossbars.



FRONT

5A-1D

BACK

The '**W**' in '**GNW**' and the
'**W**' in '**DWIGHT**' have
both crossbars high,
Narrow '**G**'.

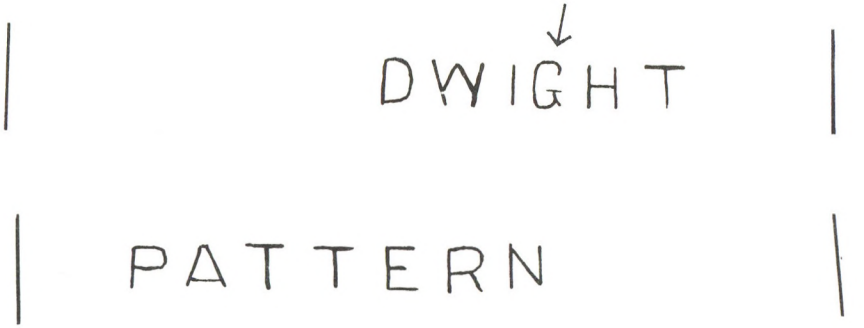
(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-1E

BACK

'**G.N.W.**' blot out.
The '**W**' in '**DWIGHT**'
has a high crossbar.
Narrow '**G**'.



FRONT

5A-1F

BACK

The '**W**' has high crossbars.
'**DWIGHT**' close
to left mold line.

FRONT

5A-1G

BACK

'**G.N.W.**' blot out.
The '**W**' has high crossbars.
'**DWIGHT**' close
to left mold line.

(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this modified marking.)

FRONT

5A-1H

BACK

The '**W**' in '**DWIGHT**' has
one high crossbar.

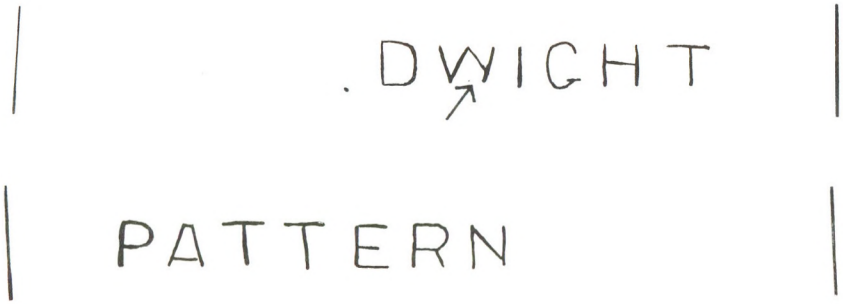
(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-2A

BACK

The '**W**' in '**DWIGHT**' has one high crossbar.



FRONT

5A-2B

BACK

Narrow '**D**' in '**DWIGHT**', high bar on '**E**' in '**PATTERN**'.

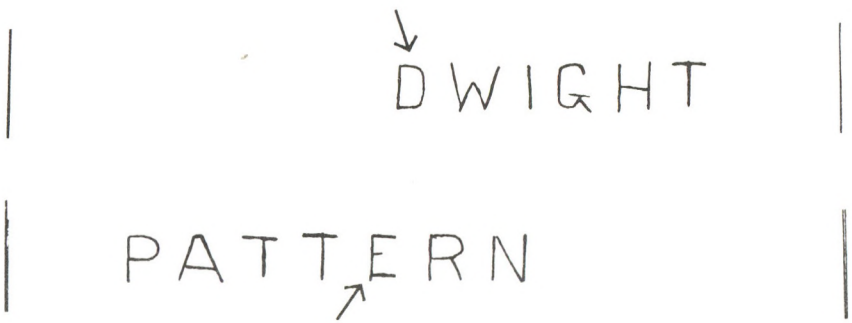
(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-3A

BACK

'**G.N.W.**' blot out.
Narrow '**D**' in '**DWIGHT**', high bar on '**E**' in '**PATTERN**'.



FRONT

5A-3B

BACK

Large '**G**' and tilted '**W**'
in '**DWIGHT**'.

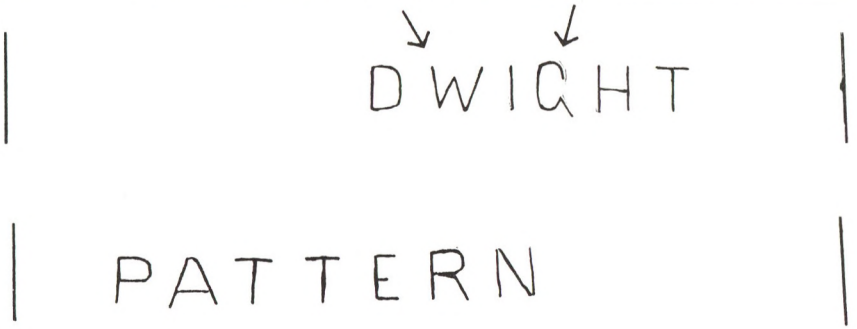
(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-3C

BACK

Large '**G**' and tilted '**W**'
in '**DWIGHT**'.
'**G.N.W.**' blot out.



FRONT

5A-3D

BACK

Short '**G**' in '**DWIGHT**',
short '**R**' leg in
'**PATTERN**'.

(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this unmodified marking.)

FRONT

5A-3E

BACK

'**G.N.W.**' blot out.
Short '**G**' in '**DWIGHT**',
short '**R**' leg in
'**PATTERN**'.

FRONT

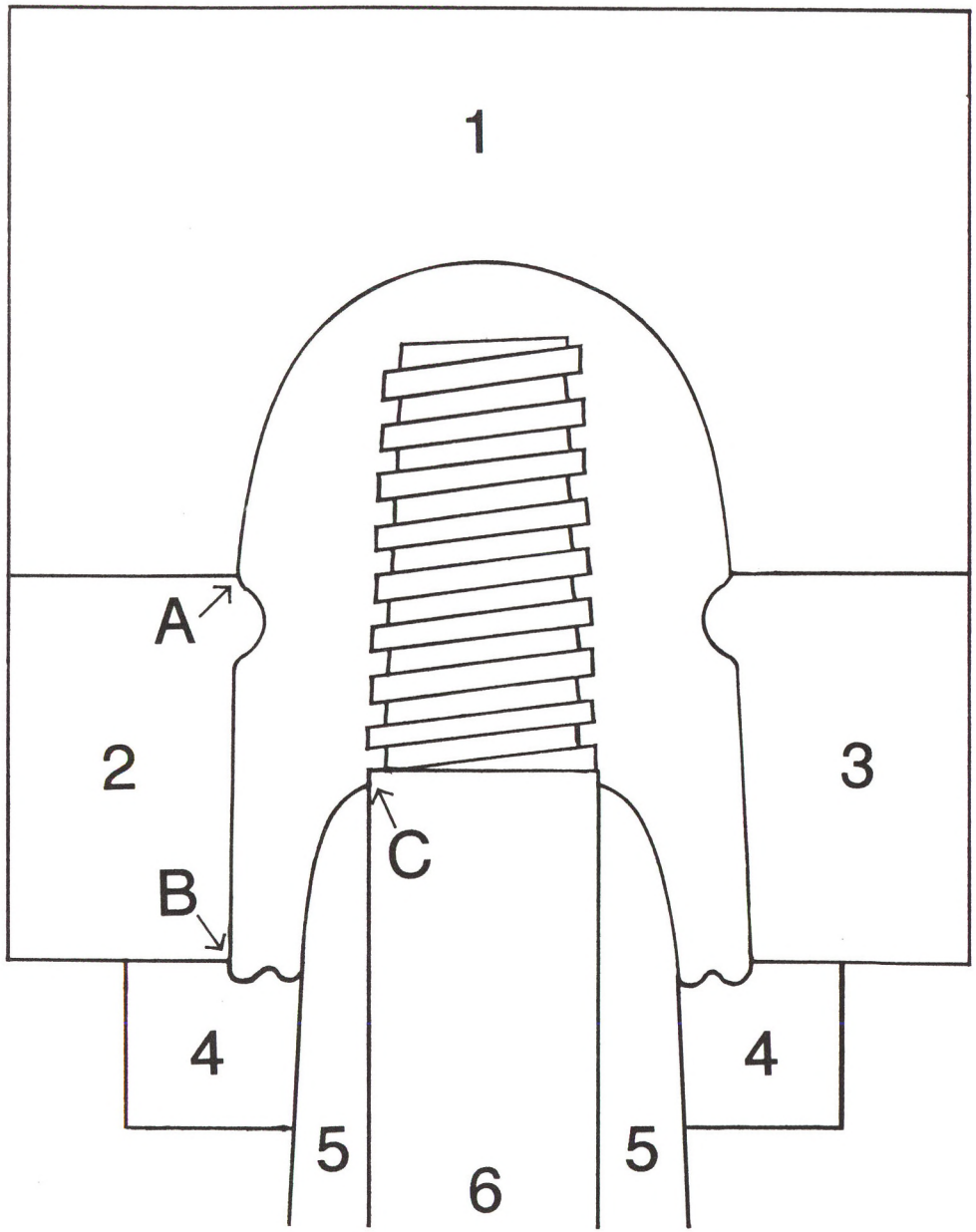
5A-3F

BACK

5-B

G.N.W DWIGHT
DWIGHT

CD-143



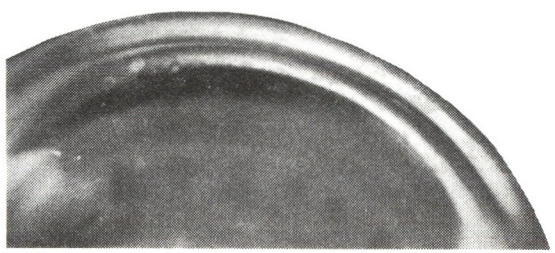
5B3B

5-B

G.N.W. DWIGHT
DWIGHT

CD-143

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The skirt mold parts meet the main mold body at point '**A**', and extend to the top plate at point '**B**'. The pinch point at '**C**' indicates that the plunger (mold part **6**) did not form the inside of the skirt. No swirls or elongated bubbles in the glass near the threads indicates that the plunger did not rotate on insertion.



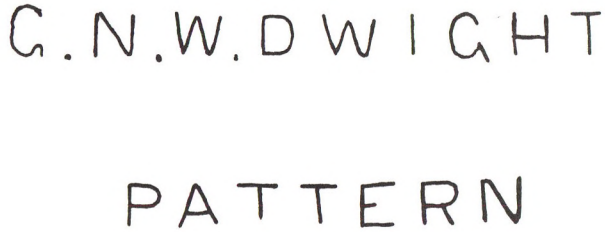
5B base detail

Type 5B insulators have a grooved base. Most items found also have a backwards number '2' on the dome top. The G.N.W. DWIGHT marking has been dated prior to 1905, when H.P. Dwight left G.N.W. The insulators with the G.N.W. removed would date from after 1905. 5B1A is the only following 5B listing which has been located with the G.N.W. marking.

The 5B **G.N.W. DWIGHT** and **DWIGHT** insulators have been found in the following colours:

light aqua
aqua
blue aqua
blue
green aqua
light green aqua

Dome top is without a backward '**2**'.

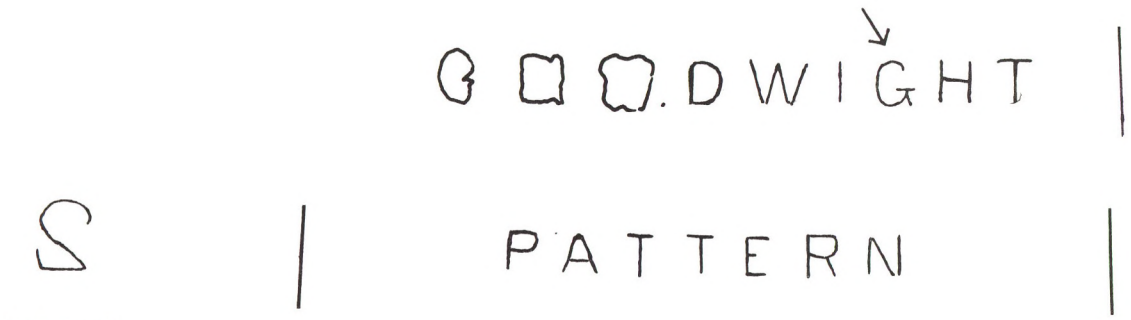


FRONT

5B-1A

BACK

Wide '**G**' in '**DWIGHT**', '**DWIGHT**' close to right mold line, large backward '**2**' on dome.



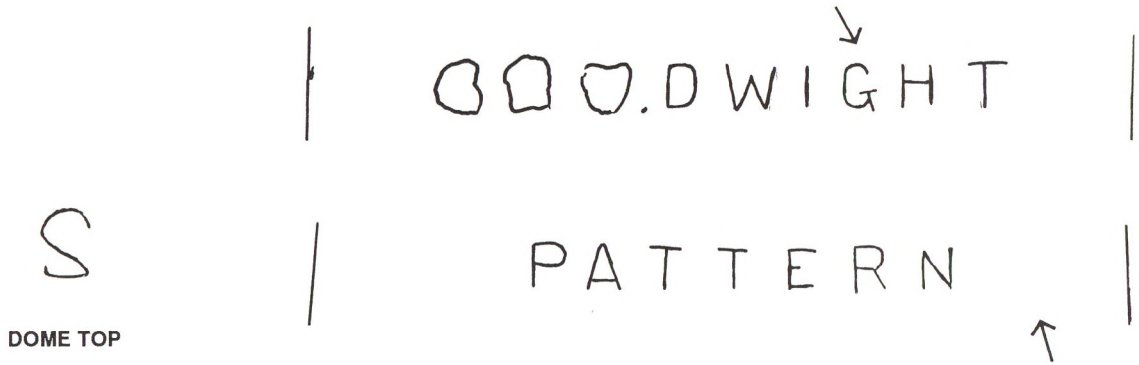
FRONT

5B-2B

BACK

DOME TOP

Narrow '**G**' in '**DWIGHT**', '**PATTERN**' not centered on rear skirt, large backward '**2**' on dome.



FRONT

5B-3B

BACK

DOME TOP

Blot-out of '**G.N.W.**',
Backward '**2**' on
the dome top.

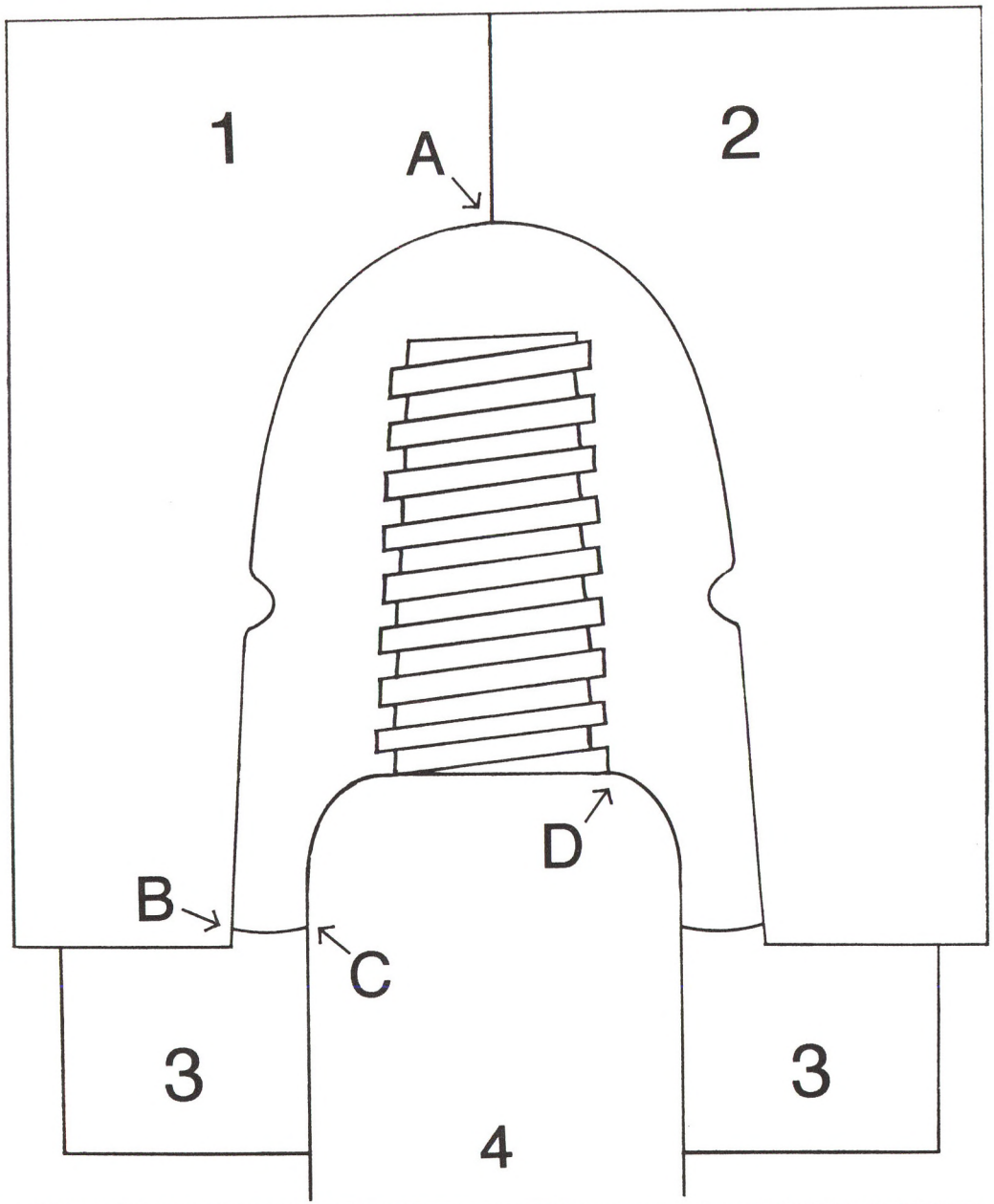
FRONT

(Specimen reported to exist, example not available)

5B-4B

BACK

DOME TOP



6-A / 6-B

GREAT NORTHWESTERN TELEGRAPH CO

CD-143

6A1B

6-A / 6-B

GREAT NORTHWESTERN TELEGRAPH CO

CD-143

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a two piece mold.

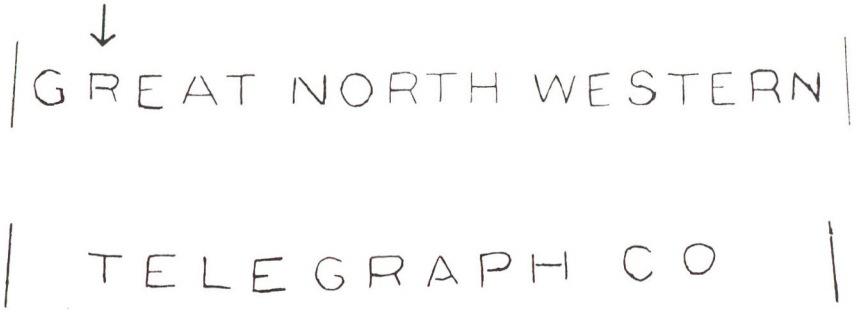
The type 6 insulators all have a swirl-start to the threads. They have been found with and without a grooved base. The grooved base is similar to that of the type 3B Montreal Telegraph mold, and may have been a H.P. Dwight influence. The type 6A and 6B insulators have been roughly dated from 1880 to 1884.

6A1A no period before or after '**CO**'.

The 6A and 6B **GREAT NORTHWESTERN TELEGRAPH CO** insulators have been found in the following colours:

aqua
green aqua
light green

Small '**R**' in '**GREAT**', no periods.

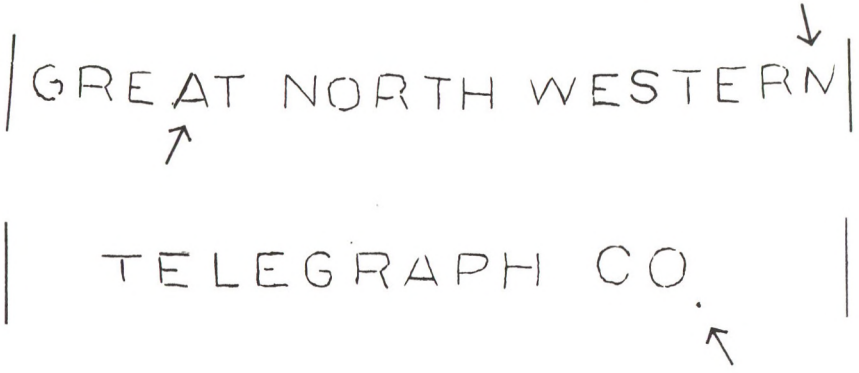


FRONT

6A-1A

BACK

Crooked '**N**' bar in '**WESTERN**', low '**A**' crossbar in '**GREAT**', period after '**CO**'.

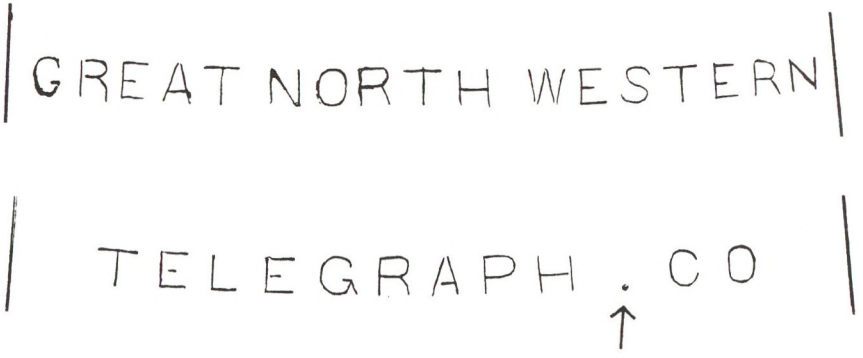


FRONT

6A-1B

BACK

Period before '**CO**'.



FRONT

6A-1C

BACK

Grooved base.
(Same mold sides
as **6A-1B**)

GREAT NORTH WESTERN

FRONT

6B-1A

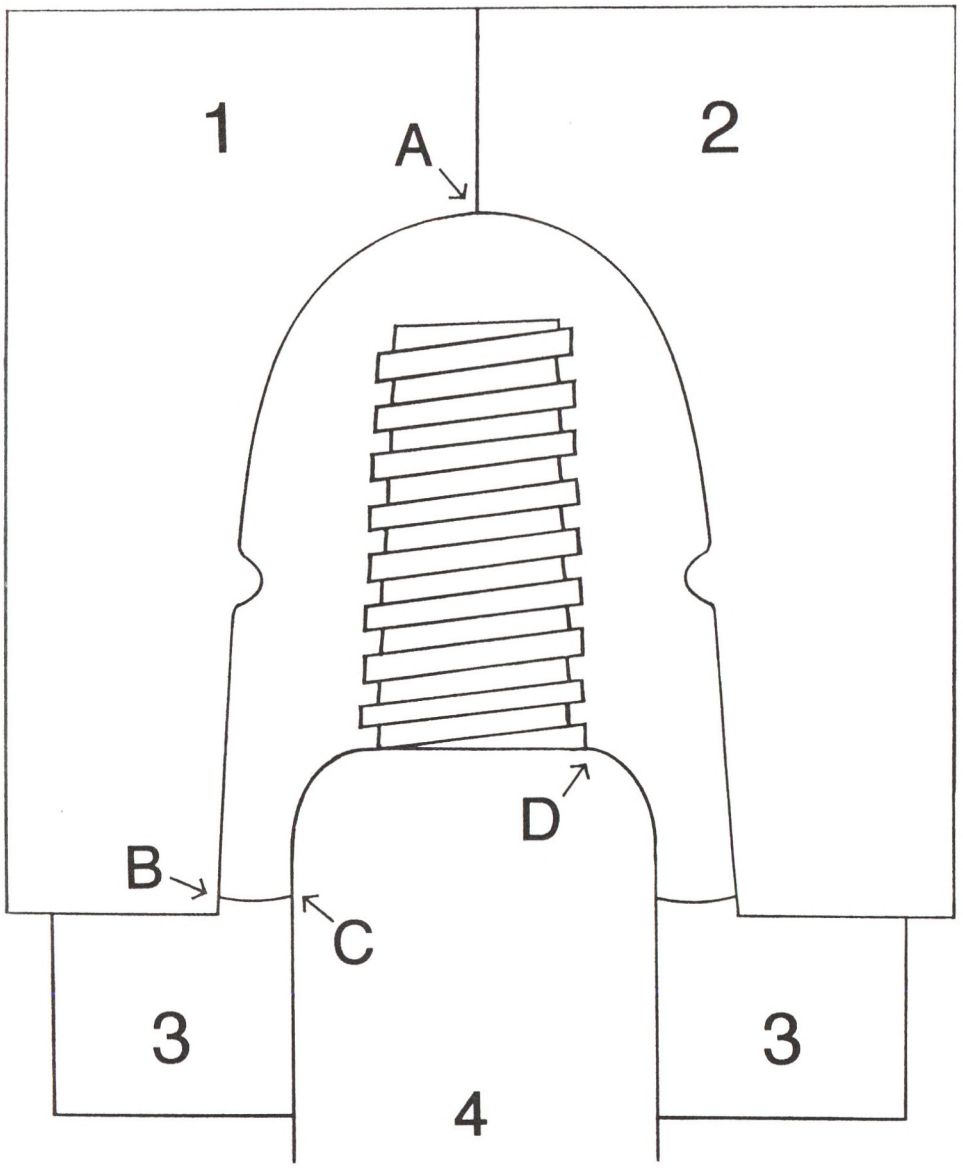
TELEGRAPH CO.

BACK

6-C / 6-D

G.N.W

CD-143



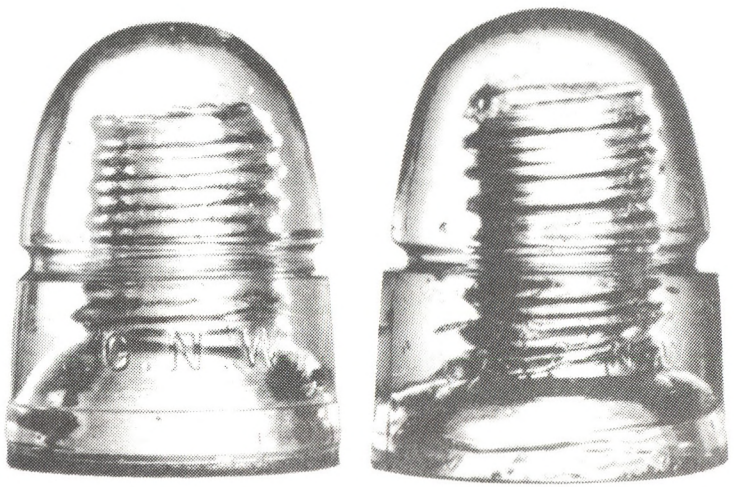
6D

6-C / 6-D

G.N.W

CD-143

6C raised band erasure.



6-C and **6-D G.N.W** insulators.
Note the raised band on the **6-C** item.

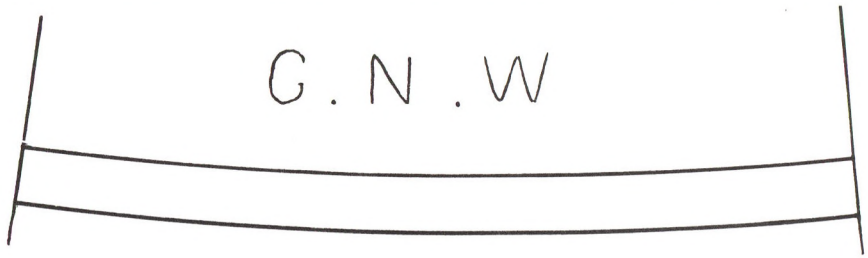
Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

The 6C and 6D insulators were formed the same way as the 6A and 6B items, and also have a swirl-start to the threads. The 6C items have a machined raised band on one mold half. It has been assumed that the erased embossing was that of the 6A GREAT NORTHWESTERN TELEGRAPH CO. The 6Cs and 6Ds are roughly dated from 1884 to 1888.

The 6C and 6D **G.N.W** insulators have been found in the following colours:

light aqua
aqua
green aqua
light green
gray
smoke
purple

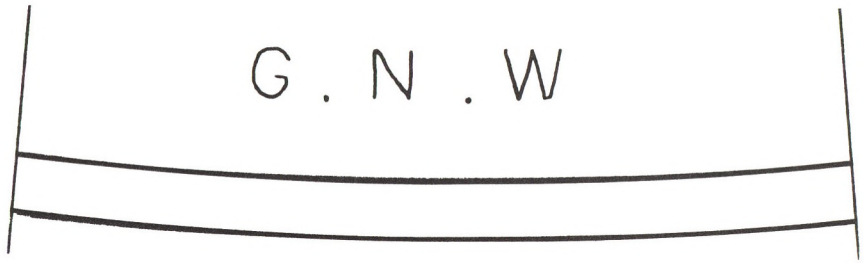
Raised slug-plate below '**GNW**'
(Blot-out of a 6-A mold).



6C-1A

Inward '**G**' hook,
wider letter spacing than above.

Raised slug-plate below '**GNW**'
(Blot-out of a 6-A mold).



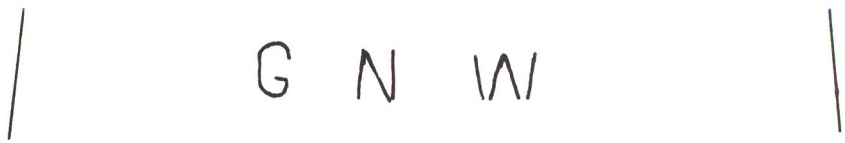
6C-1B

Raised slug-plate below '**GNW**'
(Blot-out of a 6-A mold).

(A provision has been made in the numbering system to accommodate this listing. No example of this specimen has been reported to date, but may have been manufactured with this modified marking.)

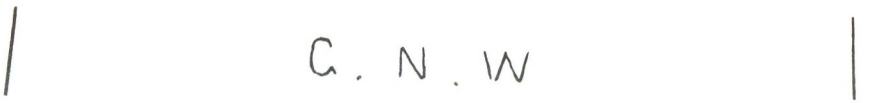
6C-1C

Uneven letter spacing,
no periods.



6D-1A

Narrow spacing,
short lettering length.



6D-1B

Very small '**G**' hook,
wide spacing.

6D-1C

Tilted '**W**', round '**G**'.
(Letters 1/4" high
and 2" long.)

6D-1D

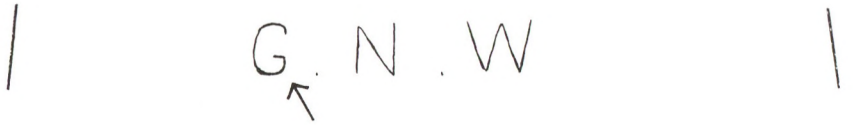
No '**G**' hook.

6D-1E

'**G**' hook outwards

6D-1F

'**G**' hook inwards,
uneven letter spacing.



6D-1G

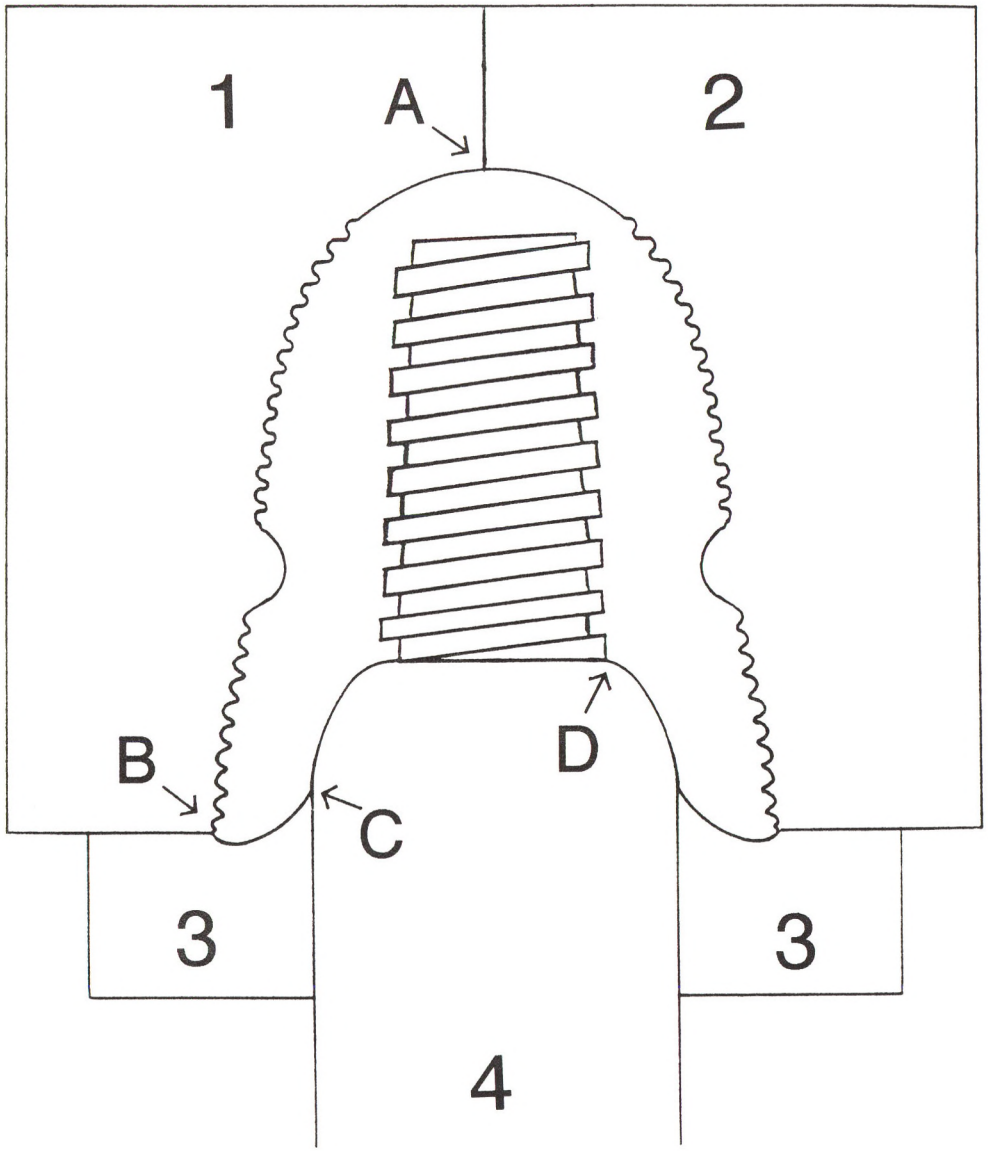
Letters 1/4" high
and 2" long.

6D-1H

7-A

(HORIZONTAL RIDGES)

CD-143



7A

7-A

(HORIZONTAL RIDGES)

CD-143

A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The pinch point at '**C**' indicates that the base was not formed by the plunger (mold part **4**). Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' do not extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt.

The 7A Withycombe insulator has a swirl-start to the threads. It has 14 circular ridges above the wire groove, and 10 spiral ridges below. The spiral ridges are double thread pitch and have left-hand thread direction. Although the period these insulators were manufactured dates after the development of the three-piece mold, this newer technology could not be used because the separating mold parts had to be engineered to release the ridged surface of the insulator from the mold. These Withycombe ridged insulators date from 1900 to 1908.

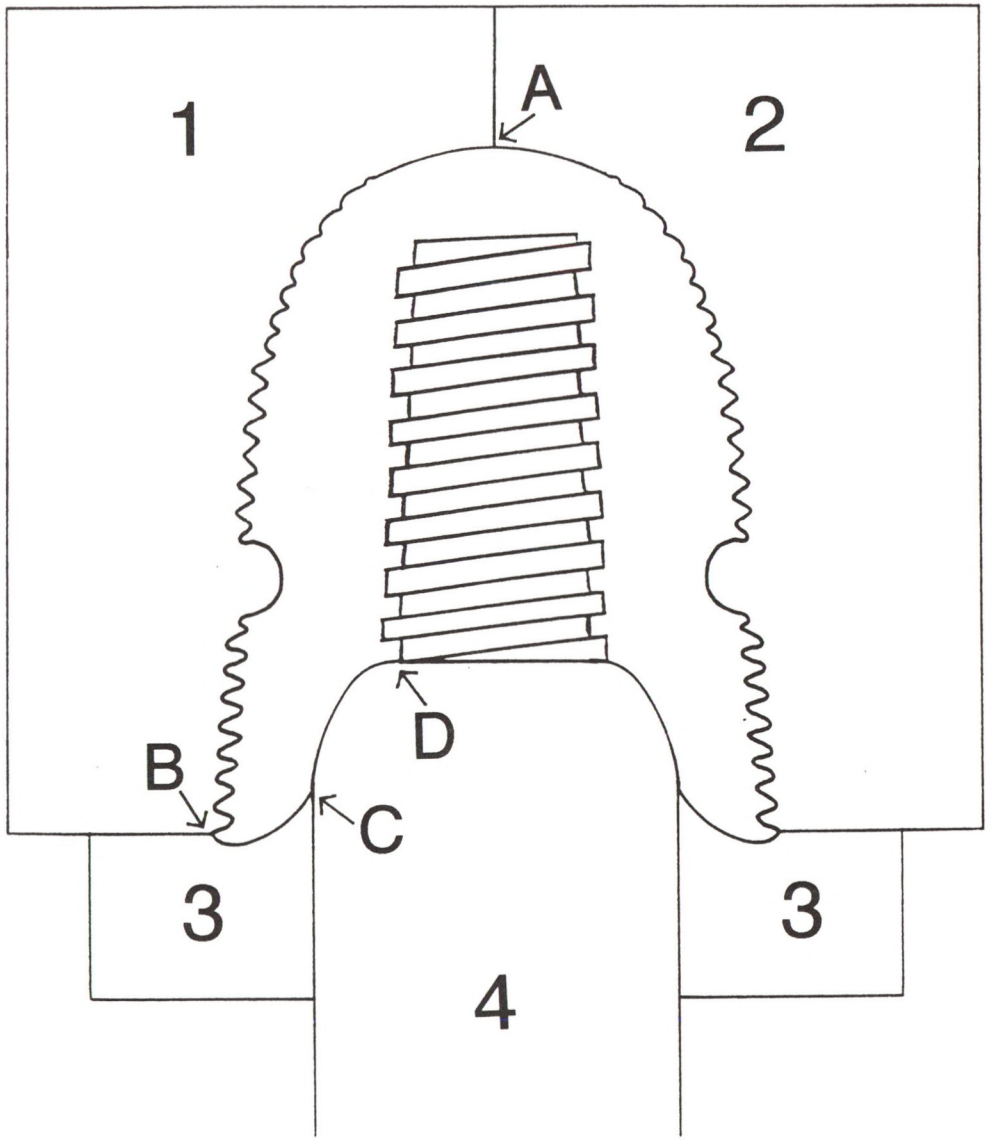
The 7A Withycombe insulator has only been found in the following colour:

light green

7-B

(HORIZONTAL RIDGES)

CD-143

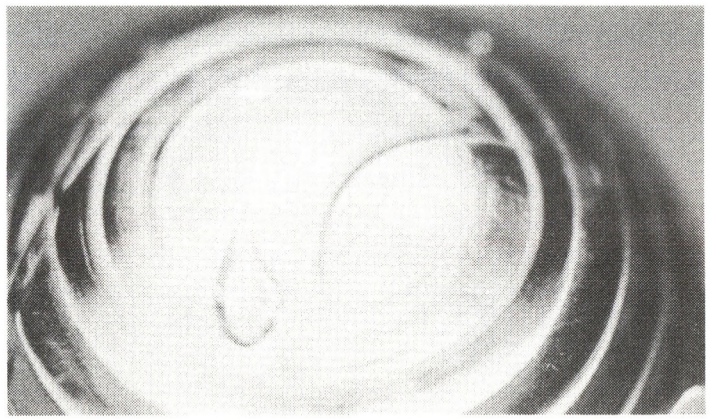


7B1

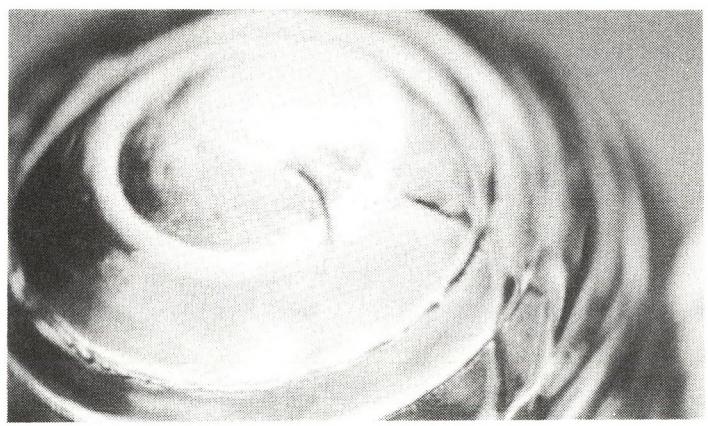
7-B

(HORIZONTAL RIDGES)

CD-143



7B1



7B2

Two different groove patterns indicating two separate molds were used to form the 7B Withycombe insulator.

A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The pinch point at '**C**' indicates that the base was not formed by the plunger (mold part **4**). Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' do not extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', and swirl-start to the threads, indicating that the plunger (mold part '**4**') also formed the inside of the skirt.

The 7B Withycombe insulator has 16 circular ridges above the wire groove, and 8 spiral ridges below. The spiral ridges are single thread pitch and have right-hand thread direction. There are two separate 7B molds known to have the same number of ridges. The first two ridges on the dome top are in different locations. This would not have been an earlier machined version of the same mold, because there is no evidence of attempts to fill or 'blot out' the ridge locations. These Withycombe ridged insulators date from 1900 to 1908.

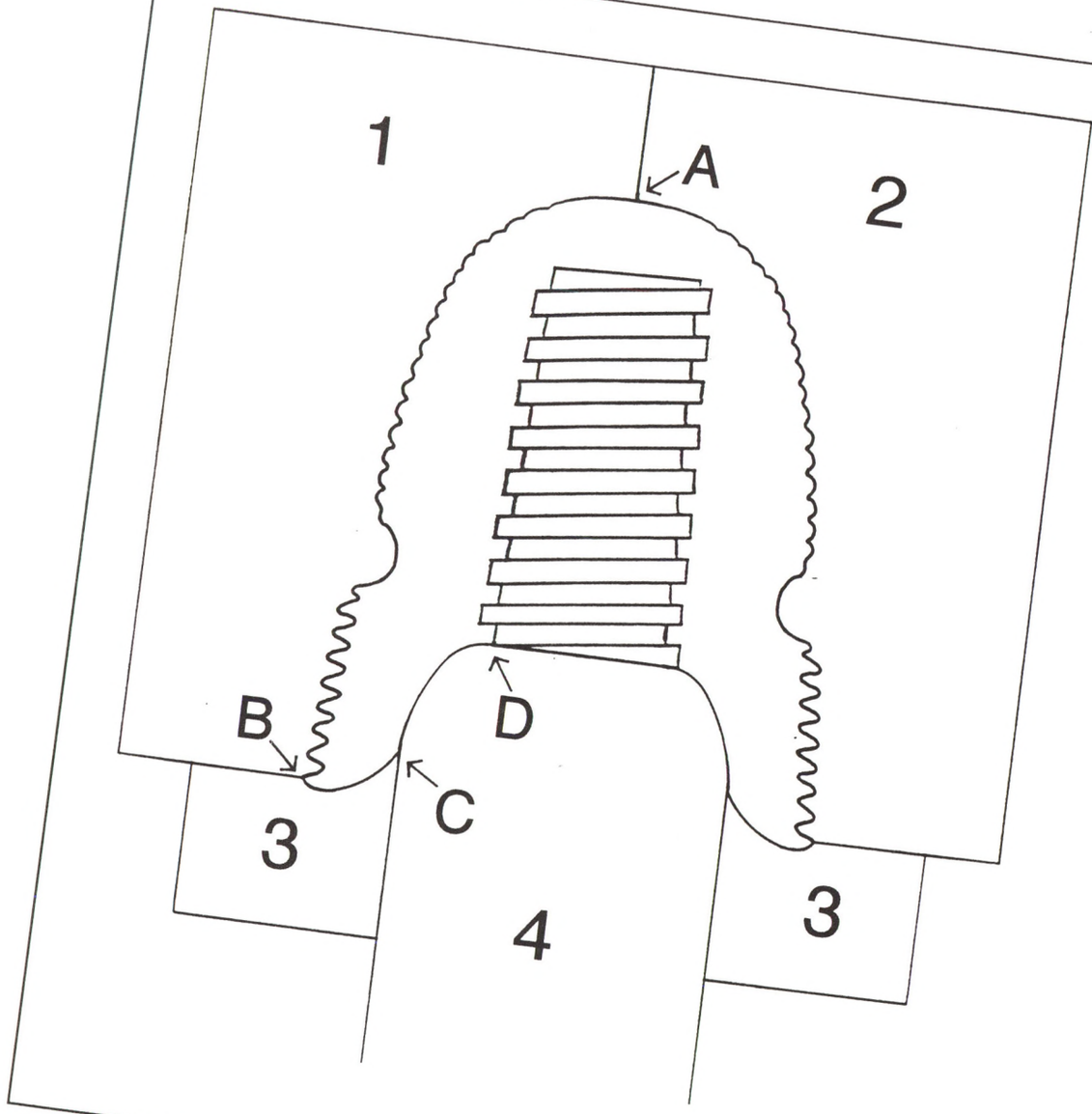
The 7B Withycombe insulator has been found in the following colours:

gray
light purple

7-C

(HORIZONTAL RIDGES)

CD-143



7C

7-C

(HORIZONTAL RIDGES)

CD-143

A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The pinch point at '**C**' indicates that the base was not formed by the plunger (mold part **4**). Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' do not extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', and swirl-start to the threads, indicating that the plunger (mold part '**4**') also formed the inside of the skirt.

The 7C Withycombe insulator is very similar to the 7B style but has 19 circular ridges above the wire groove with 10 spiral ridges below. The spiral ridges are single thread pitch and have right-hand thread direction. These Withycombe ridged insulators date from 1900 to 1908.

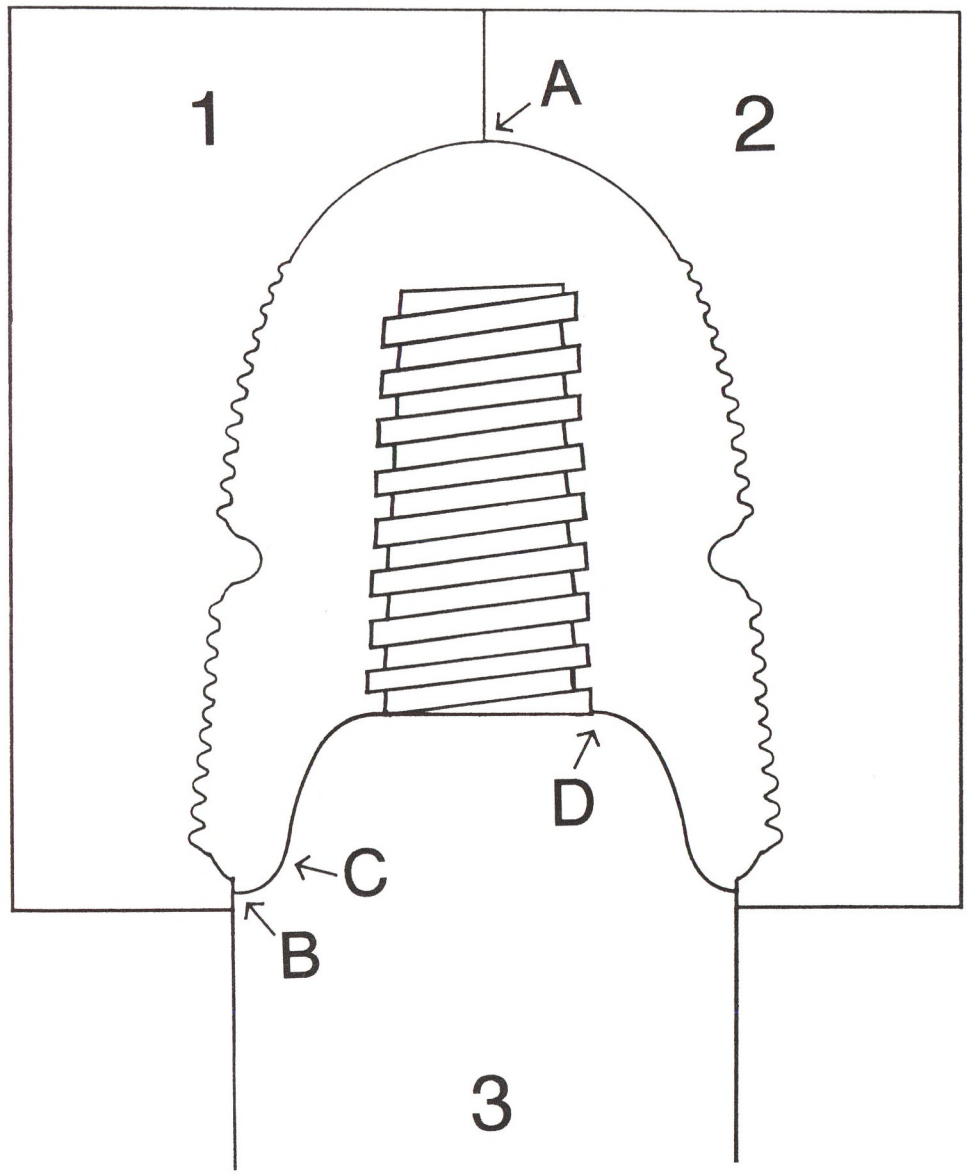
The 7C Withycombe insulator has been found in the following colours:

gray
light purple

7-D

(HORIZONTAL RIDGES)

CD-143

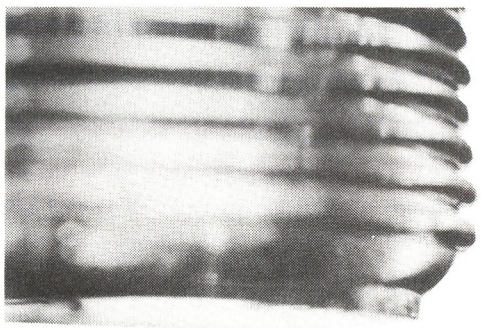


7D

7-D

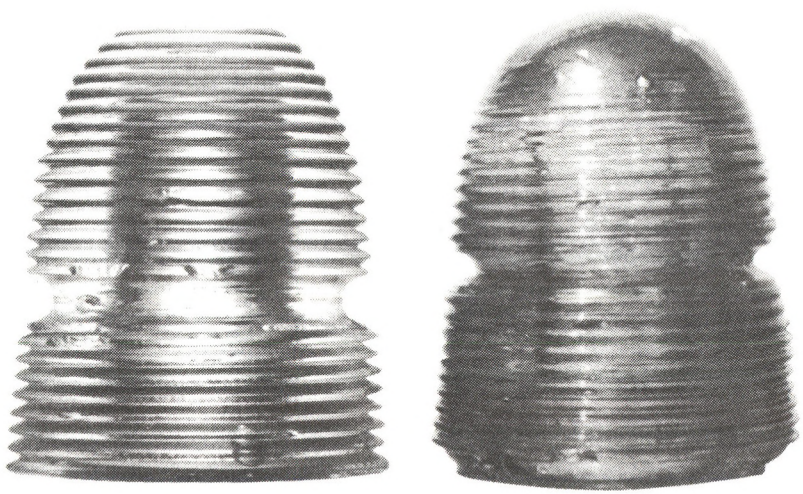
(HORIZONTAL RIDGES)

CD-143



7D base detail: Half of the base was formed by the skirt mold part, and the other half was formed by the plunger mold part.

A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The unusual location of pinch point '**B**' indicates that the skirt mold parts '**1**' and '**2**' also form part of the base. The absence of a pinch point at '**C**' indicates that part of the base was formed by the plunger (mold part **3**). There is no pinch point at '**D**', and swirl-start to the threads, indicating that the plunger (mold part '**3**') also formed the inside of the skirt.



7A and **7D**. The **7D** has a much smaller wire groove.

The 7D Withycombe insulator has 11 circular ridges above the wire groove and 10 below. Note that this is the only style with circular (not spiral) ridges below the wire groove. Although the period these insulators were manufactured dates after the development of the three-piece mold, this newer technology could not be used because the separating mold parts had to be engineered to release the ridged surface of the insulator above the wire groove. These Withycombe insulators date from 1900 to 1908.

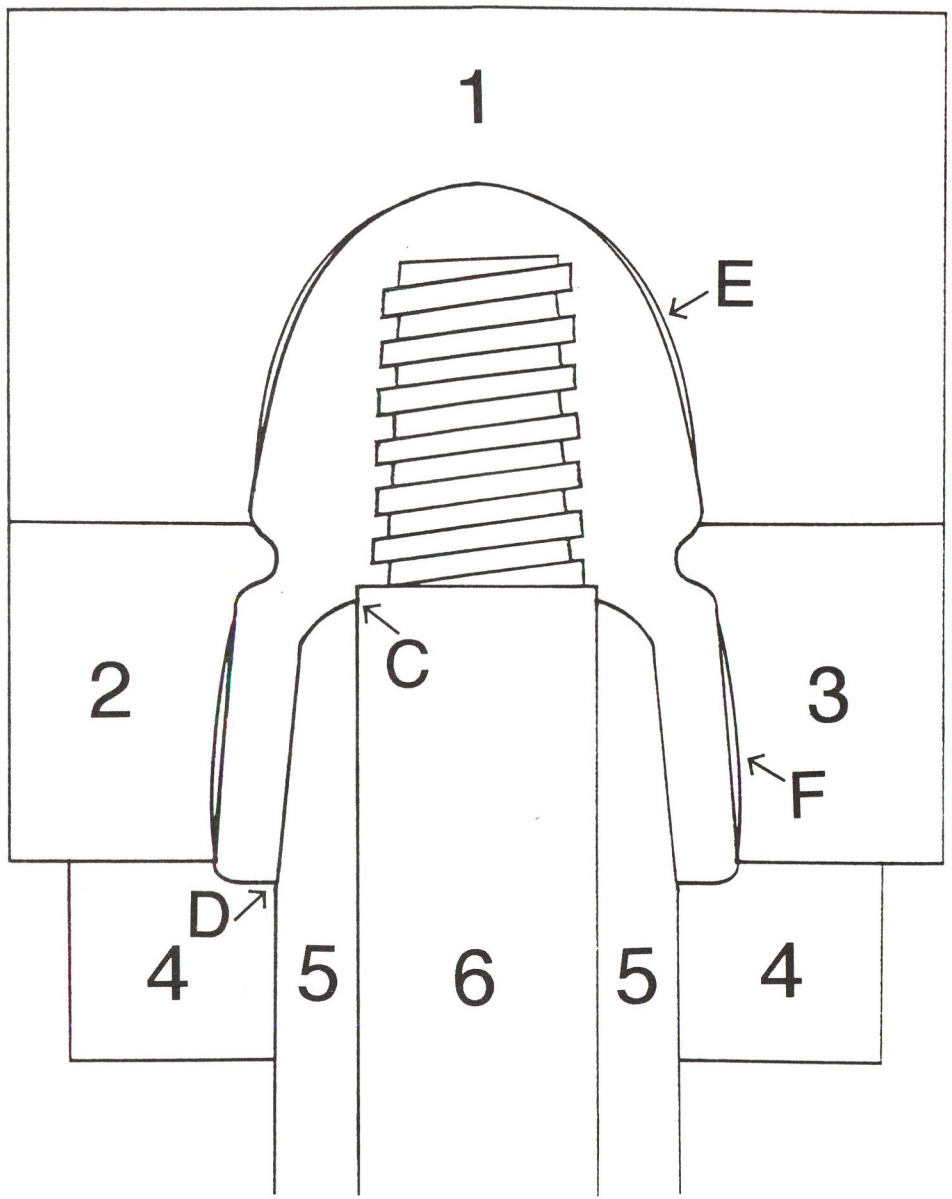
The 7D Withycombe insulator has only been found in the following colour:

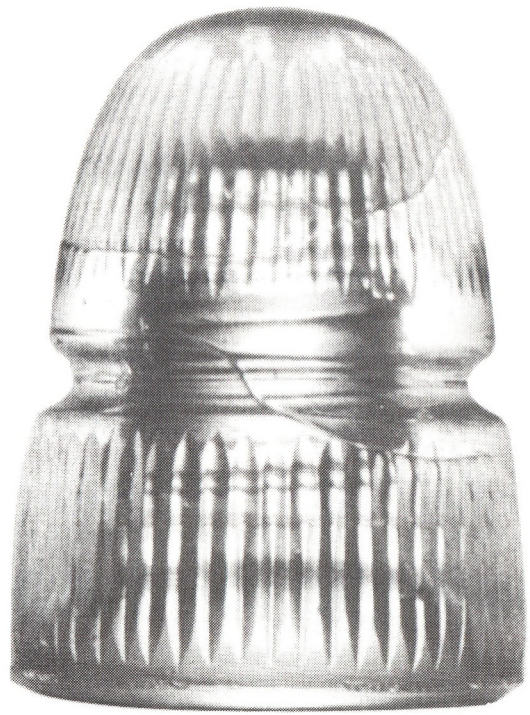
light aqua

7-E

(VERTICAL RIDGES)

CD-143



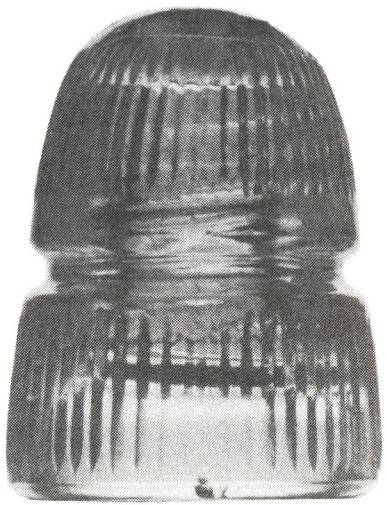


7E

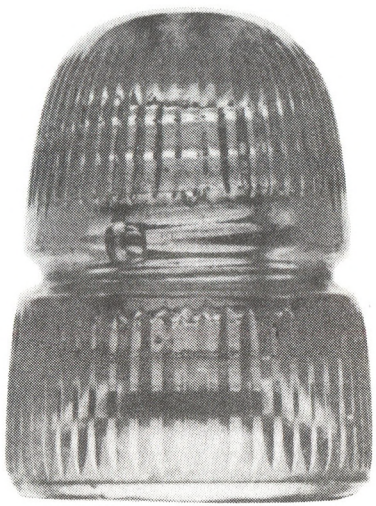
7-E

(VERTICAL RIDGES)

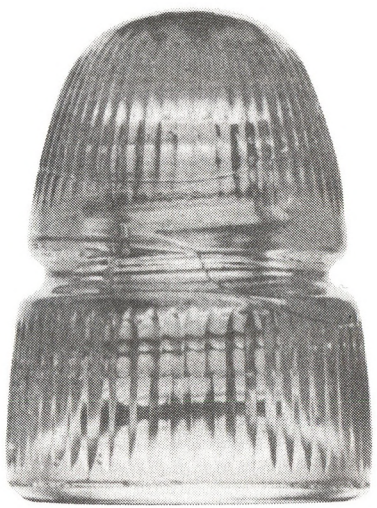
CD-143



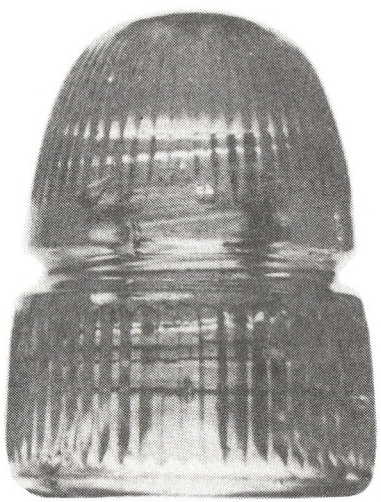
7E-1 50 vertical ridges



7E-2 52 vertical ridges



7E-3 53 vertical ridges



7E-4 54 vertical ridges

The different profiles of the 7E insulators.

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The pinch point at '**C**' indicates that the plunger (mold part **6**) did not form the inside of the skirt. As the top plate and the follower would be stationary during the pressing action of the plunger, the insertion of the plunger would produce another pinch point at '**D**' as it forced glass up into the base. Areas '**E**' and '**F**' are grooves machined into the surface of the mold to produce the ridges which extend beyond the main outer profile of the insulator.

The **7E** Withycombe insulators have 50, 52, 53 and 54 vertical ridges above and below the wire groove. The **7E** Withycombe molds were three-piece molds. As the ridges above the wire groove are vertical, two separating mold parts were not needed to release this area of the insulator after pressing. These Withycombe insulators date from 1900 to 1908.

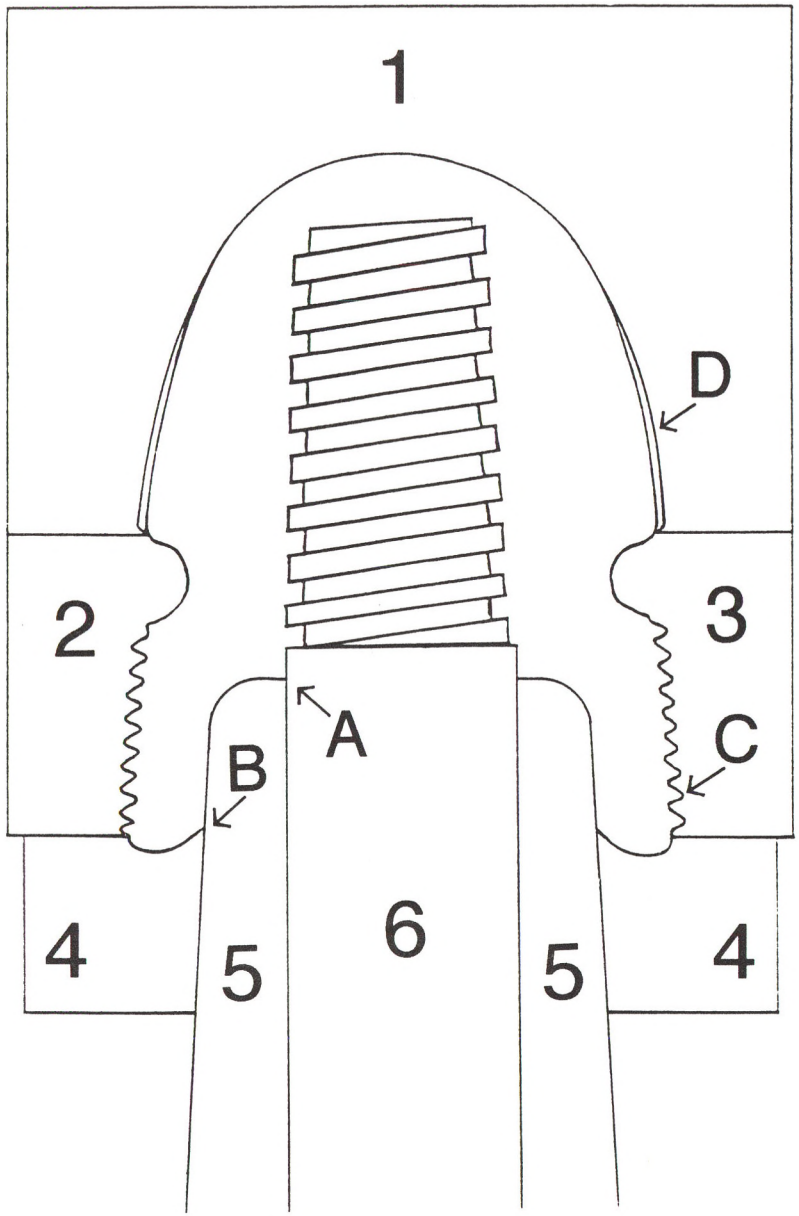
The **7E** Withycombe insulators have been found in the following colours:

aqua	dark yellow green
green aqua	blue aqua
green	blue

7-F

(VERTICAL & HORIZONTAL RIDGES)

CD-143

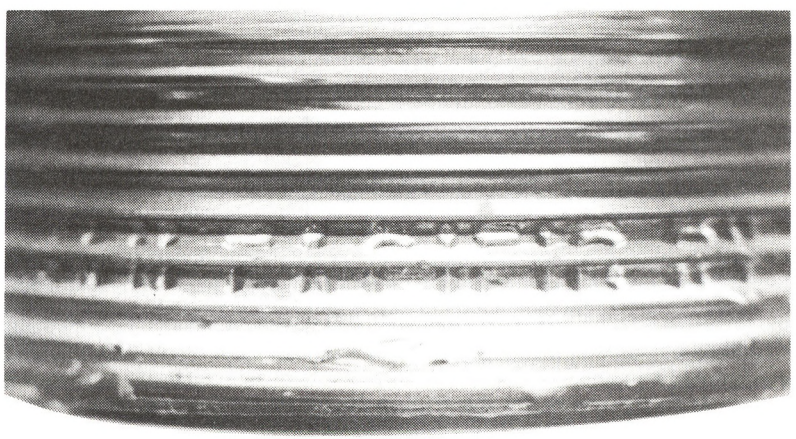


7F

7-F

(HORIZONTAL & VERTICAL RIDGES)

CD-143



CANADIAN PACIFIC RY CO can still be seen on the mold skirt behind the horizontal ridges.

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base only, as the follower (mold part **5**) formed the inside of the skirt. The pinch point at '**A**' indicates that the plunger (mold part **6**) did not form the inside of the skirt. The point at '**B**' indicates the follower did not form the base. Area '**C**' indicates grooves machined into mold parts '**2**' and '**3**' which produced the extended ridges below the wire groove. Area '**D**' indicates the vertical lines machined into mold part '**1**'.

The **7F** Withycombe insulators have 69 vertical ridges above and 9 spiral ridges below the wire groove. The spirals have a single left-handed thread pitch. The **7F** Withycombe molds are re-machined **1D** CANADIAN PACIFIC RY CO molds. As the ridges above the wire groove are vertical, two separating mold parts were not needed to release this area of the insulator after pressing. These Withycombe insulators would date from 1903 to around 1920.

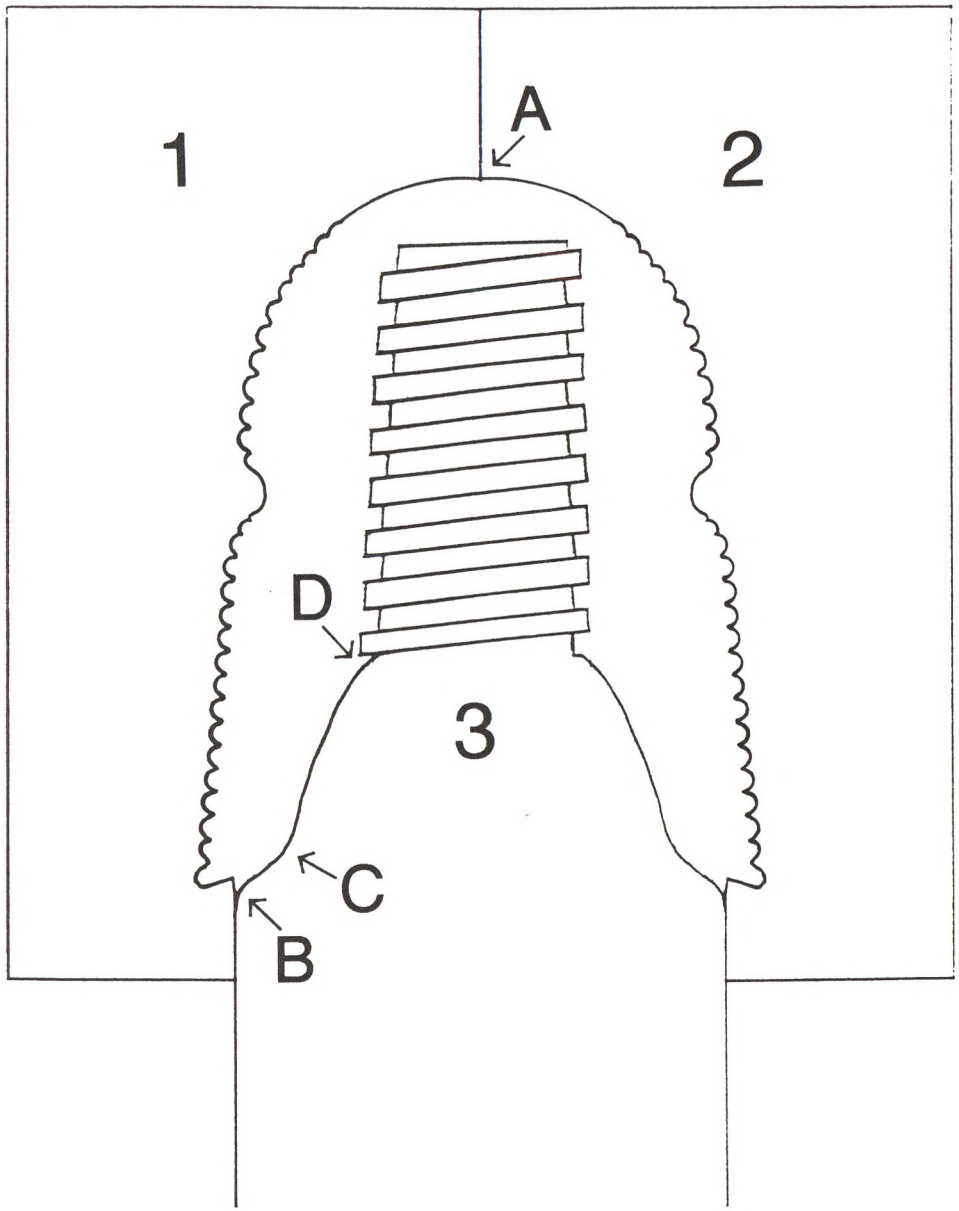
The **7F** Withycombe insulators have been found in the following colours:

light aqua
light purple

7-G

(HORIZONTAL RIDGES)

CD-144



7G CD-144

7-G

(HORIZONTAL RIDGES)

CD-144

7D and **7G** withycombes.
The wire groove on the **7G** is higher.

A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The unusual location of pinch point '**B**' indicates that the skirt mold parts '**1**' and '**2**' also form part of the base. The absence of a pinch point at '**C**' indicates that part of the base was formed by the plunger (mold part '**3**'). There is no pinch point at '**D**', and swirl-start to the threads, indicating that the plunger (mold part '**3**') also formed the inside of the skirt.

The 7G Withycombe insulator has 11 circular ridges above the wire groove and 16 below. The spiral ridges below the wire groove are a quadruple left-hand thread pitch. There are four independent ridges starting below the wire groove which spiral downward to the base. These Withycombe insulators date from 1900 to 1908.

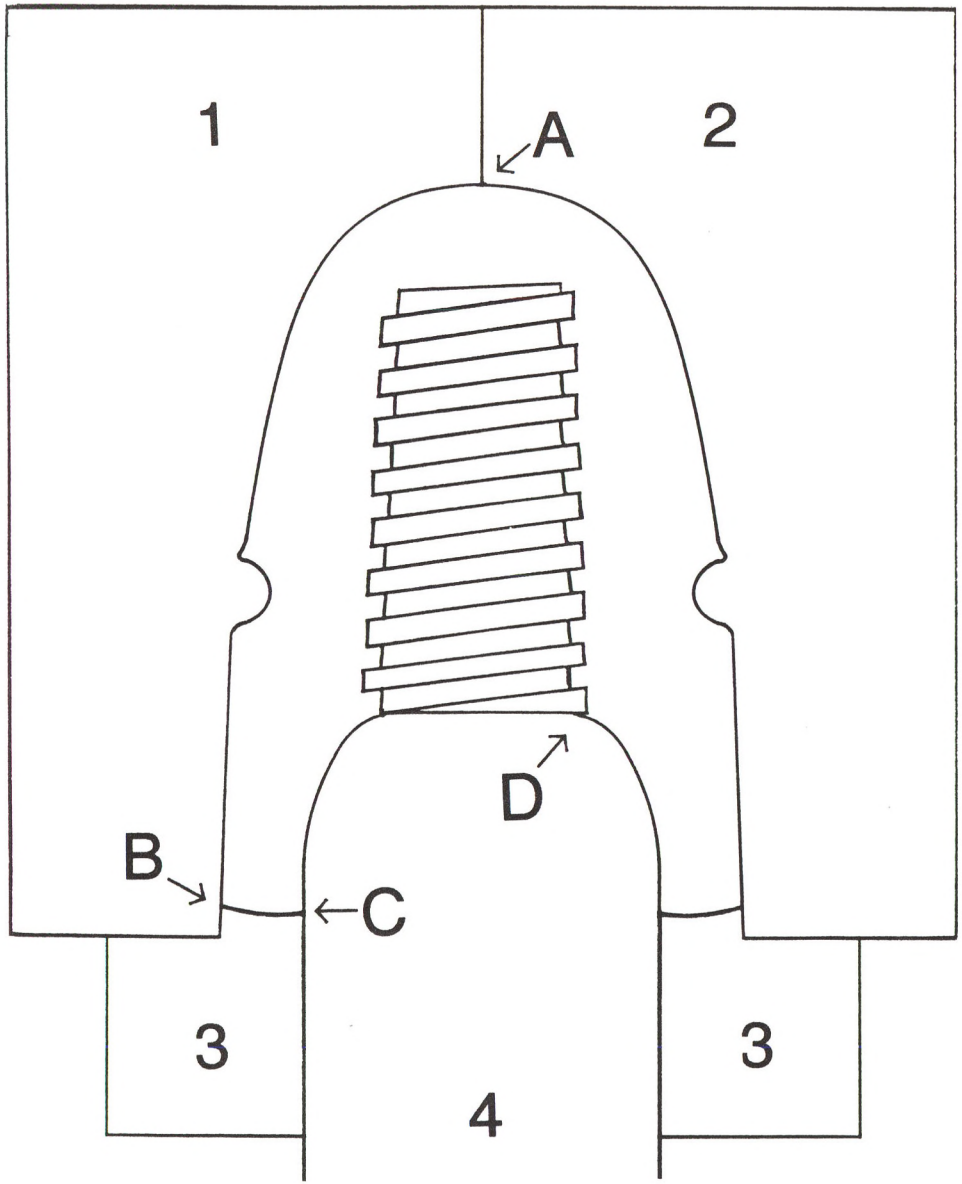
The 7G Withycombe insulator has only been found in the following colour:

light aqua

8A-1

(Unmarked)

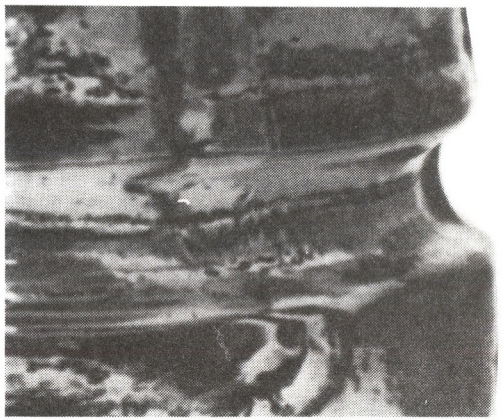
CD-143



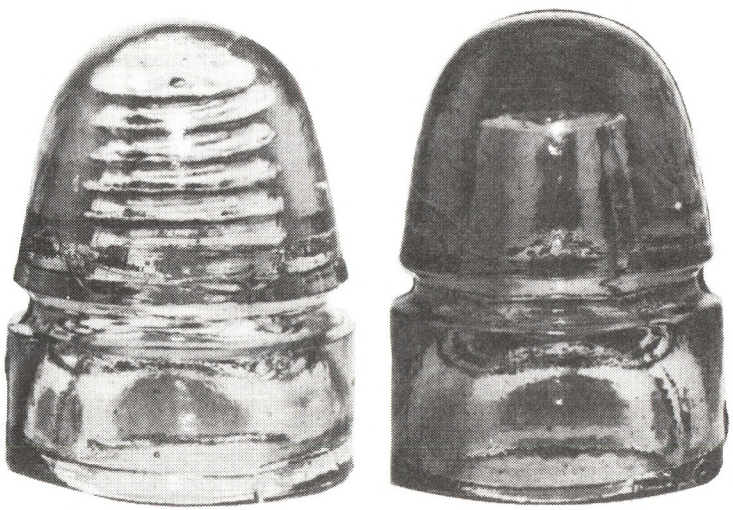
8A-1

8A-1

(Unmarked)



8A ridge detail.



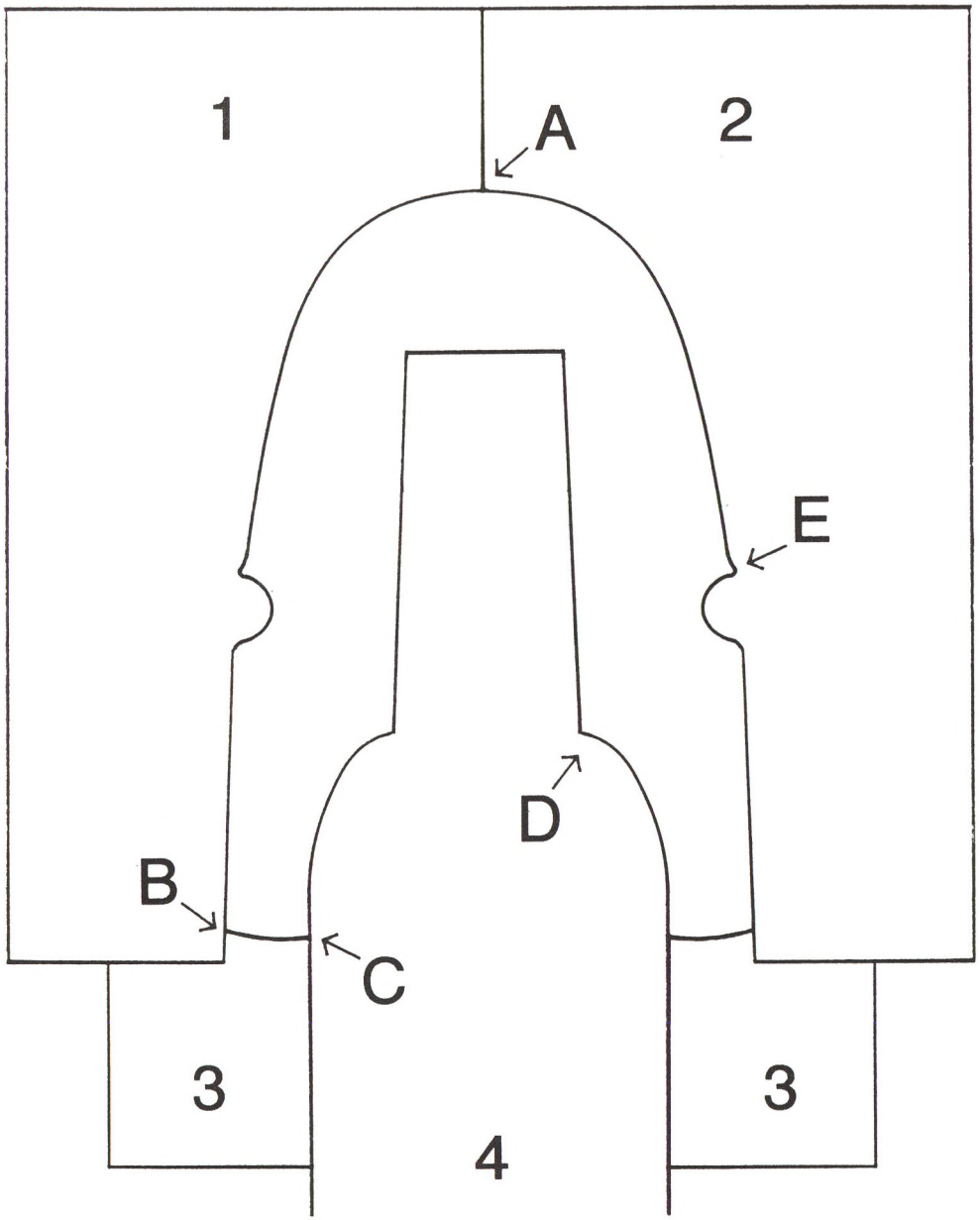
The 8A-1 threaded and 8A-2 threadless.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a two piece mold. The flared out skirt sides at area '**E**' are specific to the **8A** mold, both threaded and unthreaded.

This is the threaded version of the CD-743.1 threadless. The threaded type 8 insulators have a swirl-start to the threads. This mold style adjusted the position of the top plate (mold part '**3**') according to the volume of glass in the mold. This produced insulators of various heights. The distance from the wire groove to the top is consistent, but the height below the wire groove varies. The type 8A threaded insulators have been roughly dated from 1870 to 1885.

The 8A-1 threaded insulators have been found in the following colour:

blue aqua



8A-2

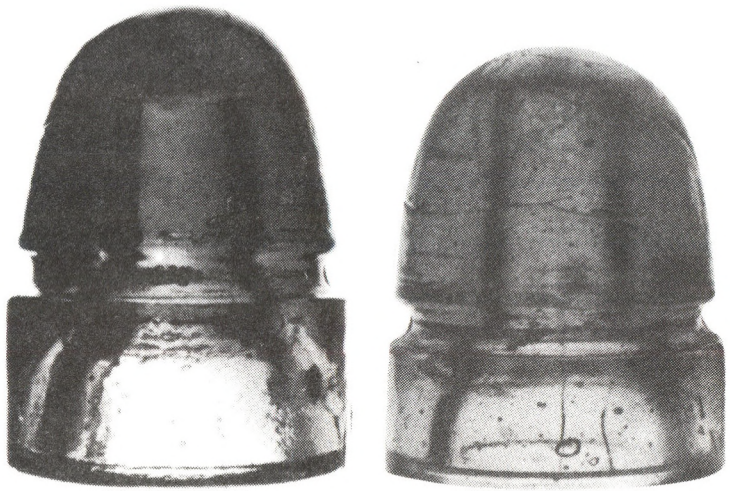
(Unmarked, Threadless)

CD-743.1

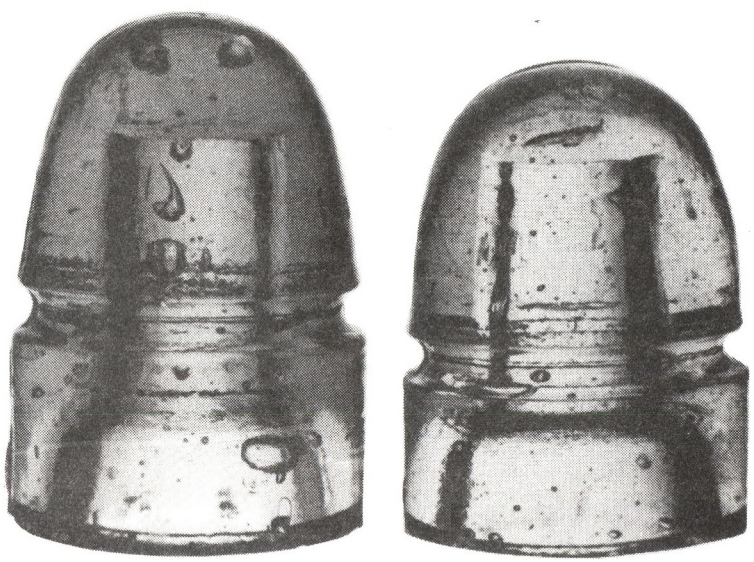
8A-2

8A-2

(Unmarked, Threadless)



8A-2A and **8A-2B**. The **8A-2B** has a more rounded top, and also includes the flared-out ridge sides.



The height of the type 8A insulators was determined by the amount of glass portioned for each pressing.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold. The flared- out wire groove ridge sides at area '**E**' are specific to the 8A mold, both threaded and unthreaded.

This is the threadless version of the CD-143 8A-1. The outer mold parts are similar, but there were no threads machined into the plunger (mold part '**4**'). This mold style adjusted the position of the top plate (mold part '**3**') according to the volume of glass in the mold. This produced insulators of various heights. The type 8A threadless has also been reported with a grooved base. The type 8A threadless insulators have been roughly dated from 1865 to 1870.

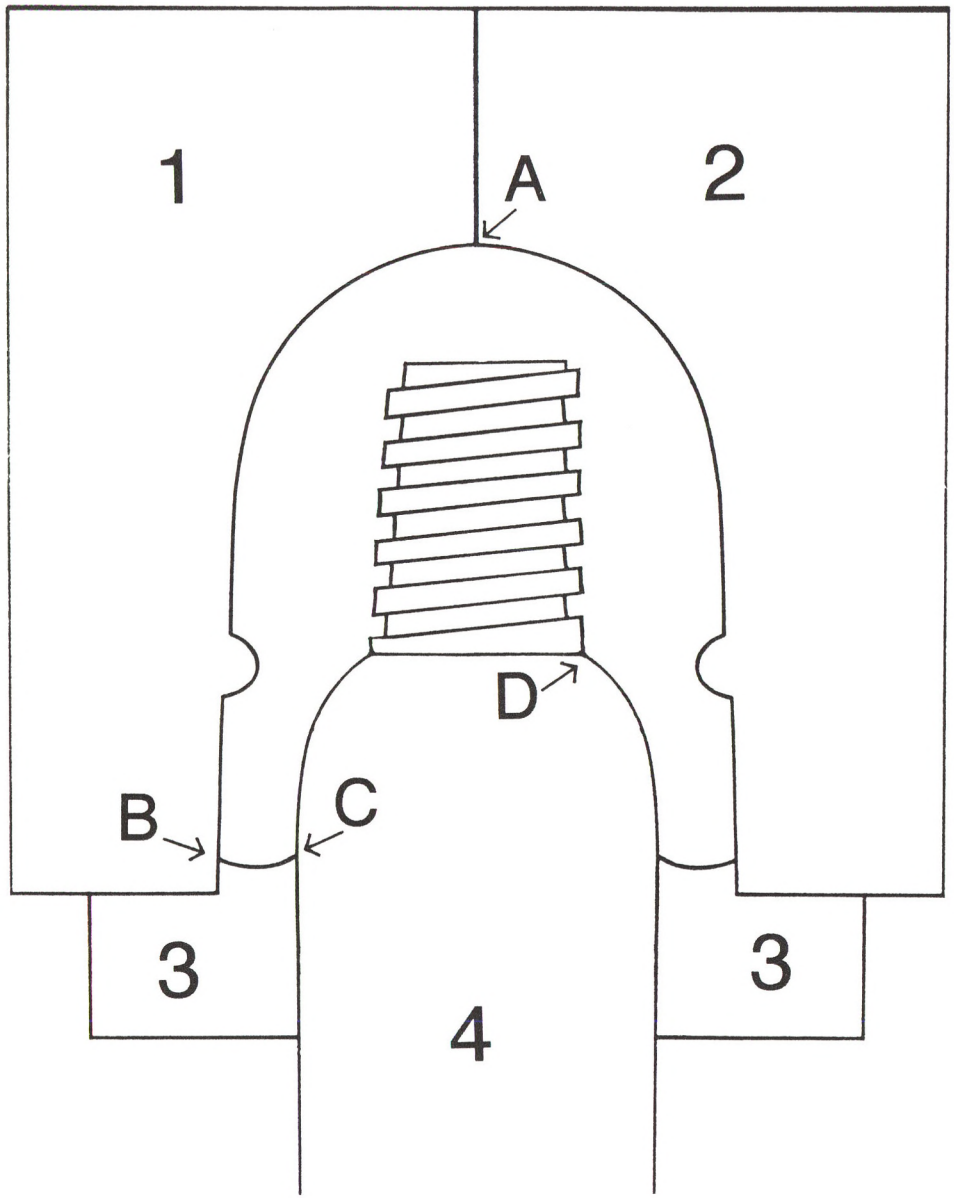
The 8A-2 threadless insulators have been found in the following colours:

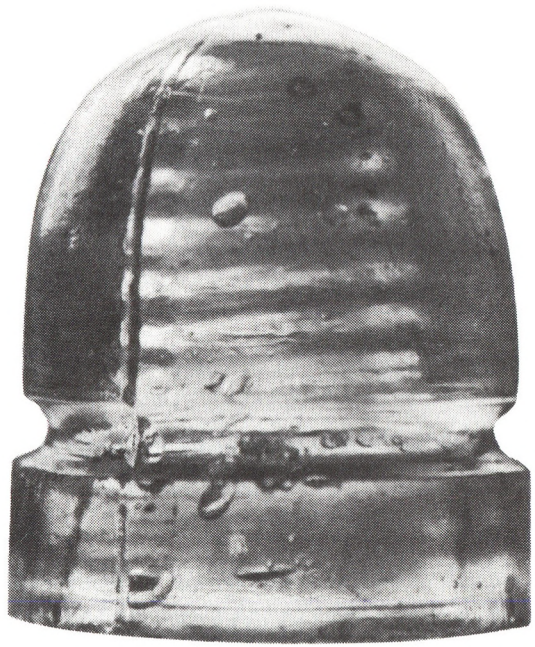
light aqua	yellow green
green aqua	light cobalt blue
light green	cobalt blue
dark green	light yellow green

8B-1

(Unmarked)

CD-143

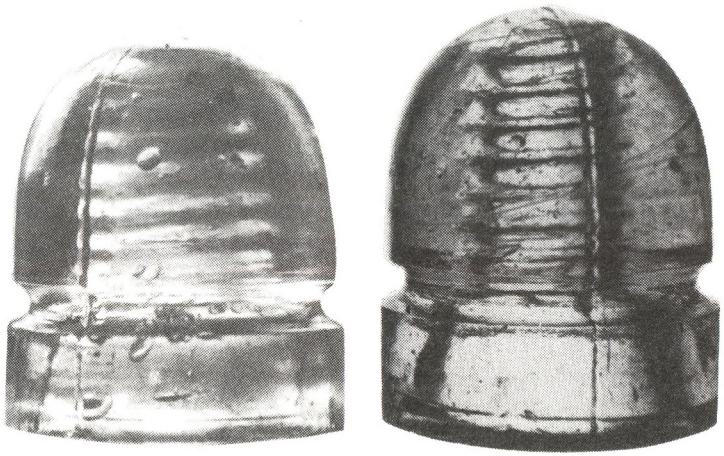




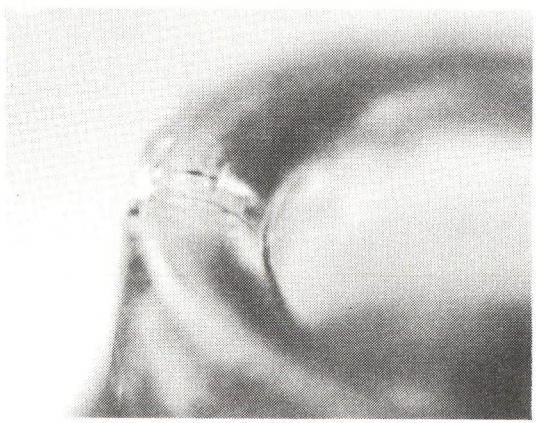
8B-1

8B-1

(Unmarked)



Two different 8B1 insulators
showing varied skirt lengths below wire groove.



8B-1 base detail

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

This style of insulator typically has a very thick mold line. This mold style also adjusted the position of the top plate (mold part '**3**') according to the volume of glass in the mold. This produced insulators of various heights. The type 8B threaded insulators have been roughly dated from 1870 to 1885.

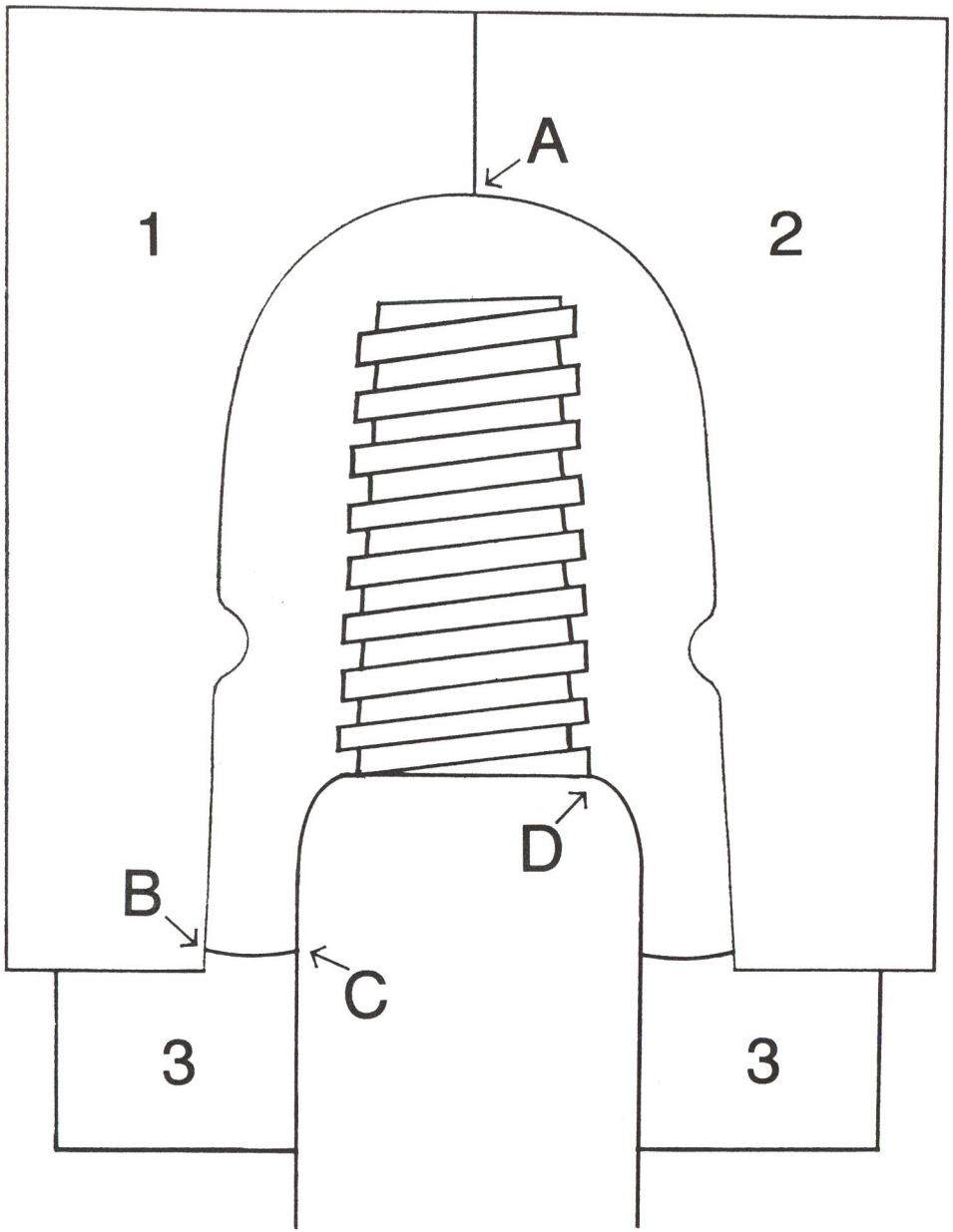
The 8B-1 insulators have been found in the following colour:

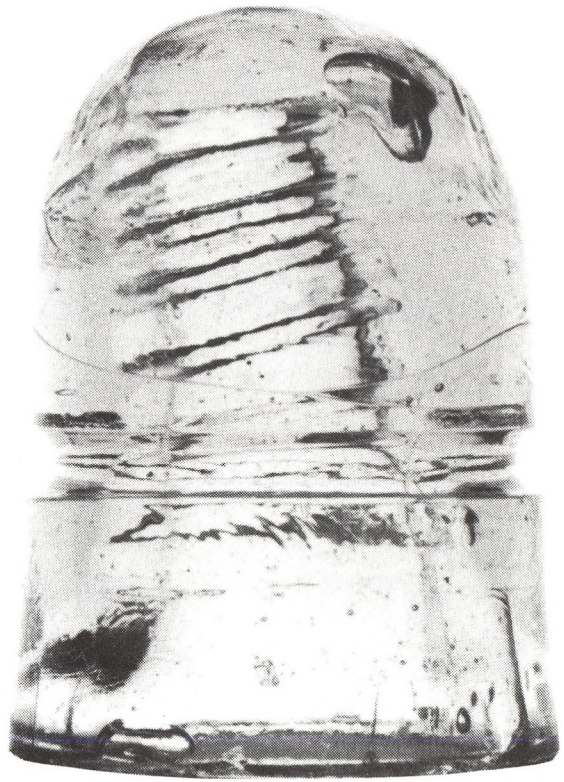
light aqua

8B-2

(Unmarked)

CD-143

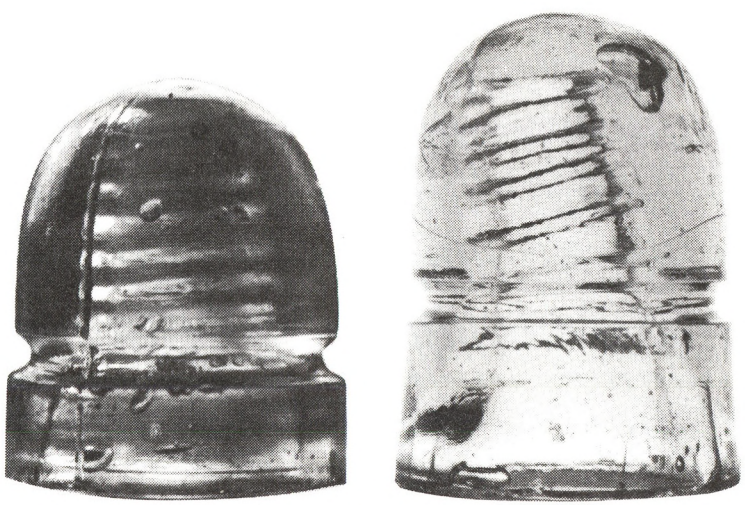




8B-2

8B-2

(Unmarked)



8B1 and **8B2** 'chubby dome' insulators.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

This is another threaded version of the CD-743.2 threadless. The threaded type 8 insulators have a swirl-start to the threads. This is similar to the same outer mold as the threadless version, but the skirt flares out slightly below the wire groove. The type 8B threaded insulators have been roughly dated from 1870 to 1885.

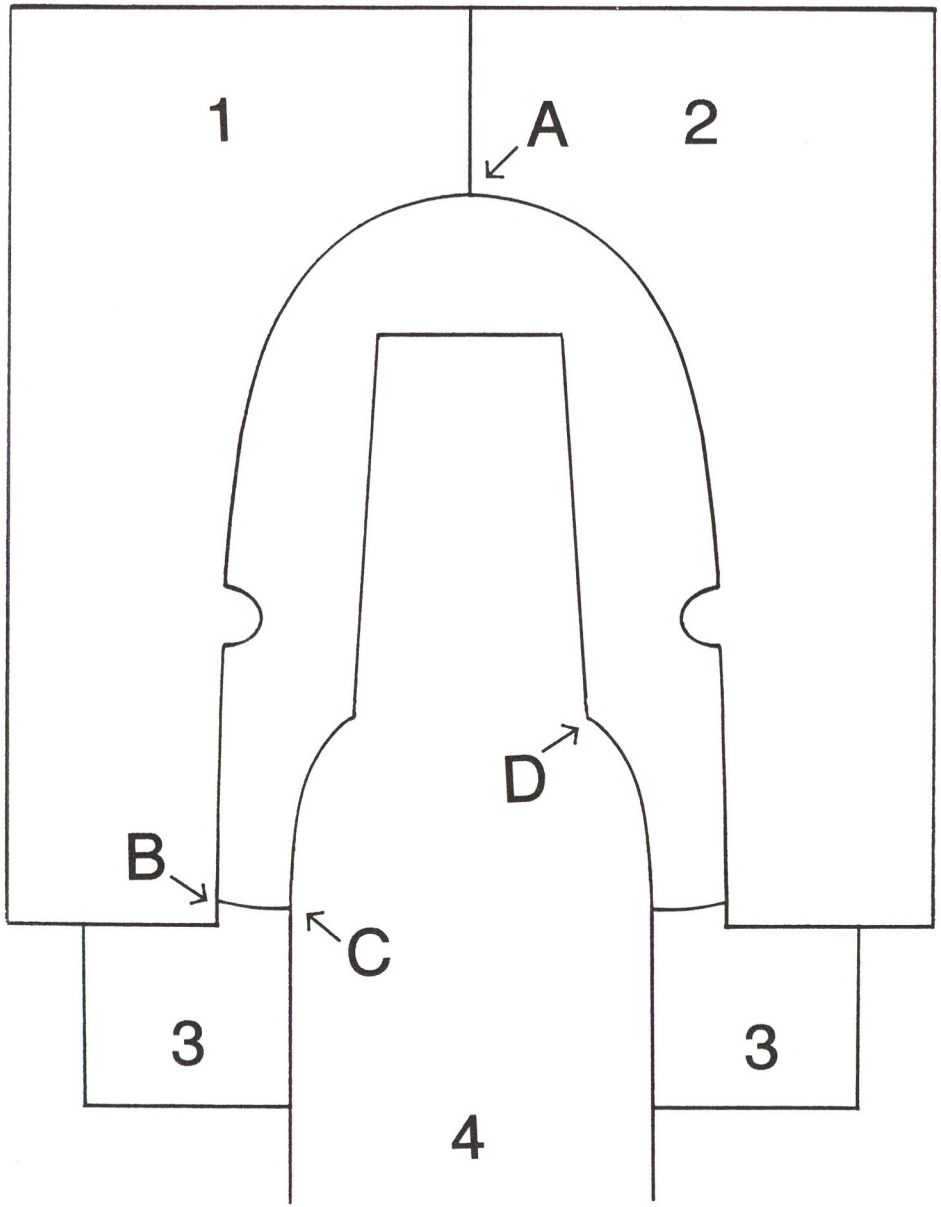
The 8B-2 insulators have been found in the following colour:

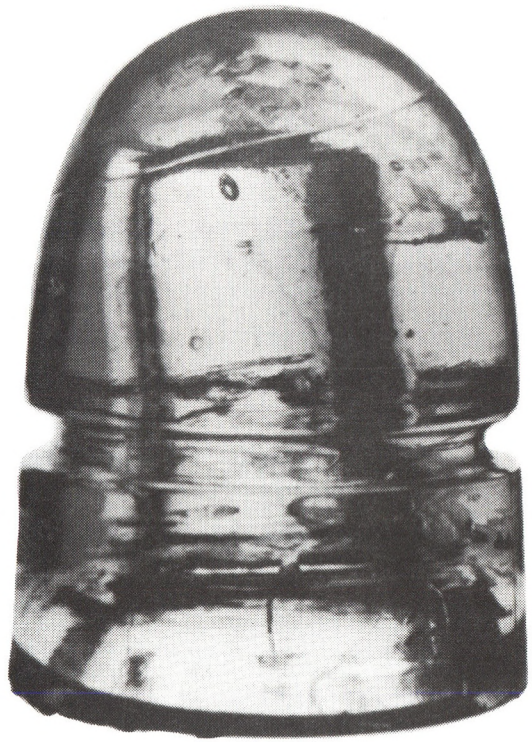
blue

8B-3

(Unmarked, threadless)

CD-743.2



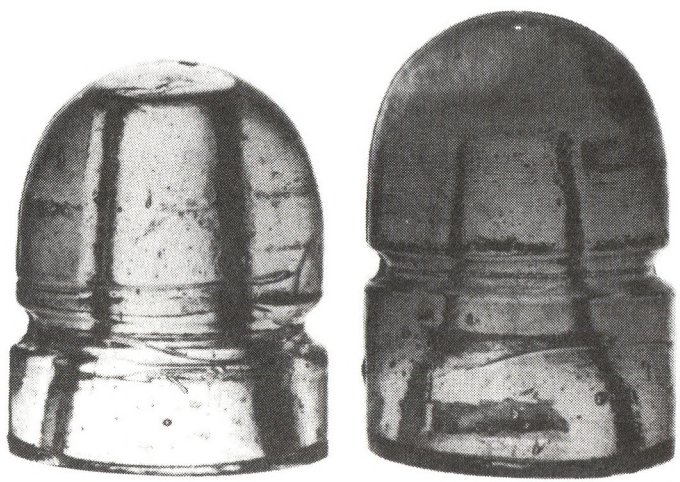


8B-3

8B-3

(Unmarked, threadless)

8B-2 threaded and **8B-3** threadless.



The different heights of the **8B-3** are determined by the amount of glass in each pressing.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

This is the threadless version of the CD-143 8B-1. The outer mold used for both was not the same. Both styles were included in this grouping because of the 'chubby' appearance of the dome and sides above the wire groove. This mold style also adjusted the position of the top plate (mold part '**3**') according to the volume of glass in the mold. This produced insulators of various heights. The distance from the wire groove to the top is consistent, but the height below the wire groove varies from specimen to specimen. The type 8B-3 threadless insulators have been roughly dated from 1865 to 1870.

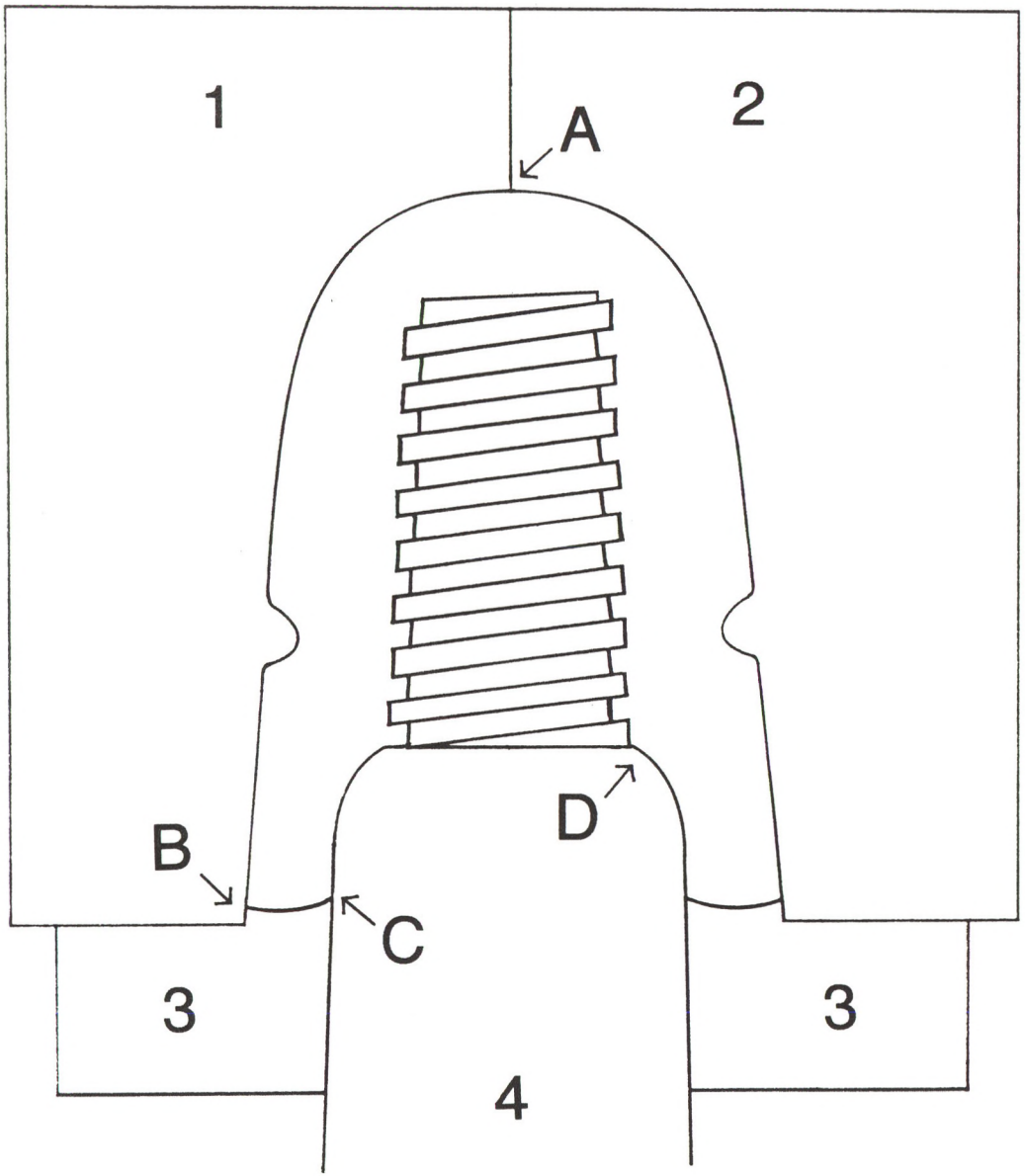
The 8B-3 threadless insulators have been found in the following colours:

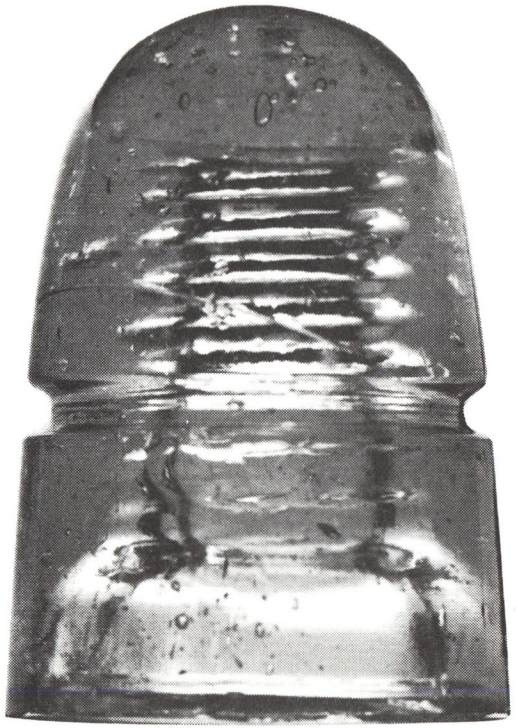
aqua
green aqua
light green
light blue
light blue aqua
light green aqua
blue aqua

8C-1

(Unmarked)

CD-143

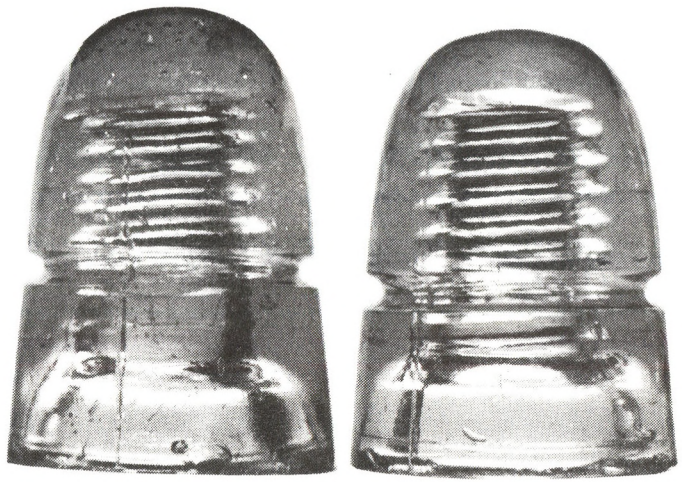




8C-1

8C-1

(Unmarked)



Different heights of the **8C-1** insulators were determined by the volume of glass portioned for each pressing.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

This is the threaded version of the CD-743.3 type 8C-3 threadless. The threaded type 8 insulators have a swirl-start to the threads. The height of these insulators can vary slightly. The type 8C-1 threaded insulators have been roughly dated from 1870 to 1885.

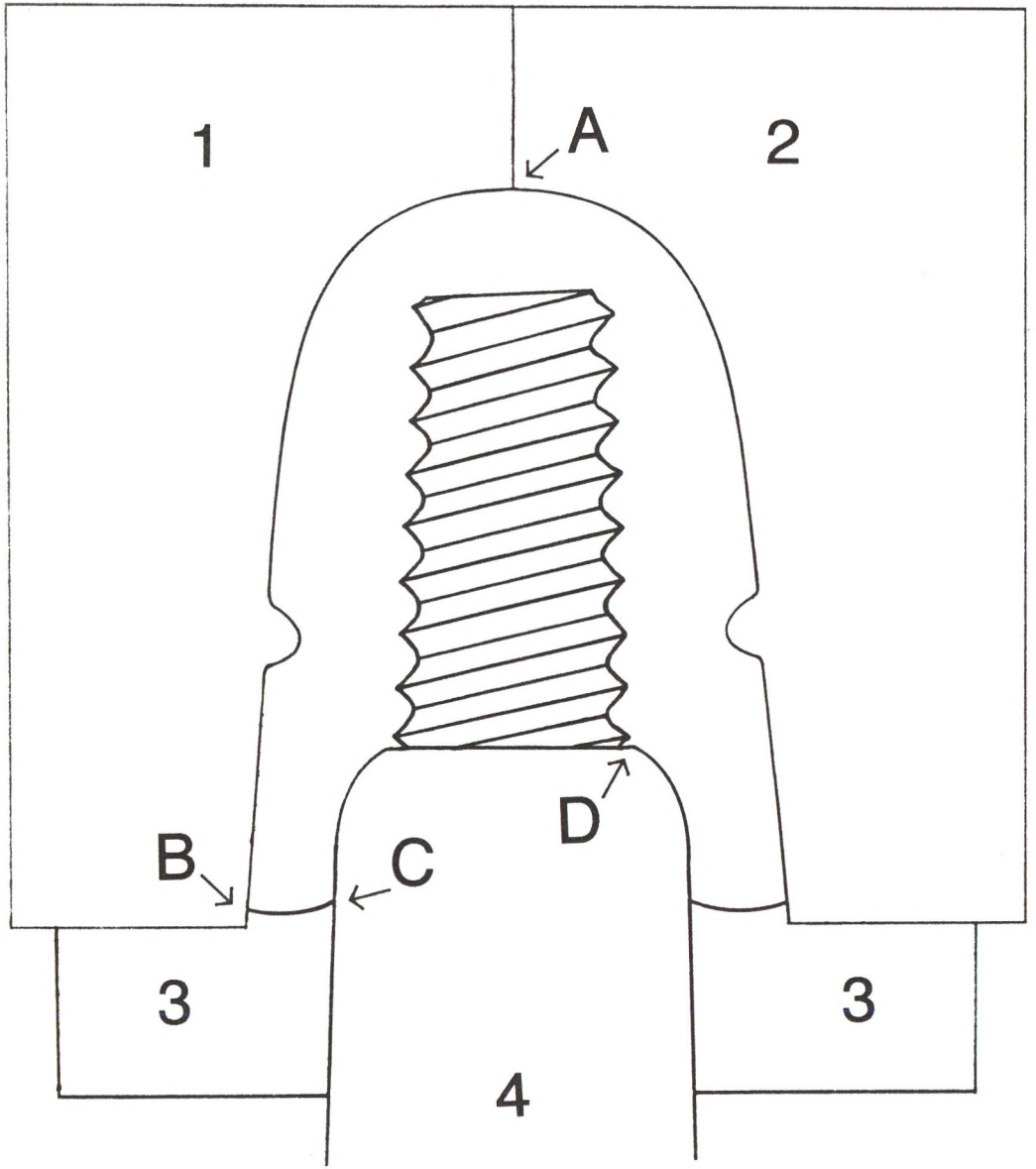
8C-1 single-threaded and **8C-2** double-threaded.

The 8C-1 insulators have been found in the following colours:

light aqua
light green
purple

8C-2

(Unmarked,
double thread pitch)
CD-143



8C-2

8C-2

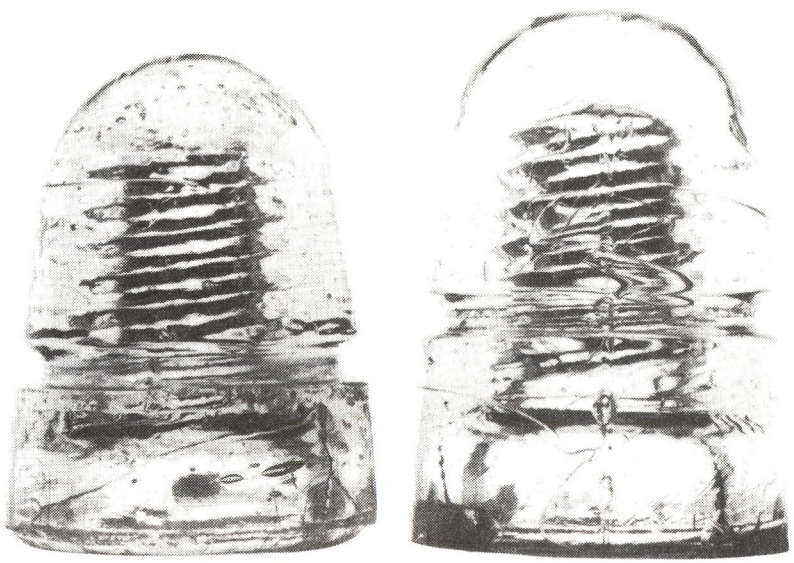
(Unmarked, double thread pitch)

8C-2A
round base

8C-2B
flat base

8C-2C
sloped-in base

The three base styles of the 8C-2 double-threaded insulator.



Different heights of the **8C-2** insulators were determined by the volume of glass in each pressing.
(Note: the short example is the **8C2-A** round base variety.)

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

This is the double-threaded version of the type 8C-1 and the CD-743.1 threadless (8C-3). As there are two independent thread ridges cut into the mandrel (mold part '**4**'), they appear at a steeper angle than the regular single-threaded styles. The threaded type 8 insulators have a swirl-start to the threads. There are several base styles found within the double-threaded mold type. The volume of glass portioned for each pressing determined the height of these insulators. These type 8C-2 insulators have been roughly dated from 1870 to 1885.

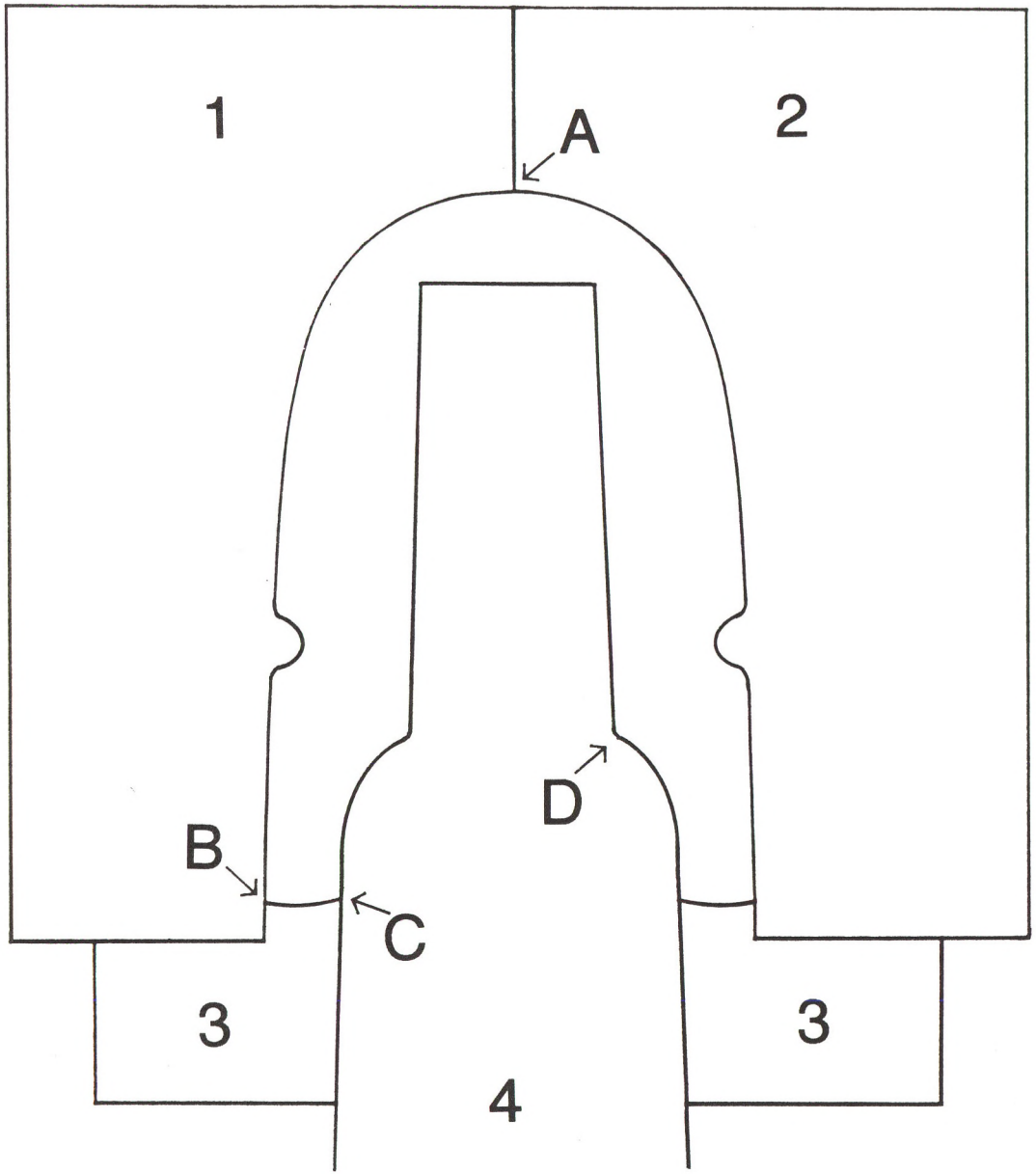
The 8C-2 double-threaded insulators have been found in the following colours:

aqua
green aqua
light green
blue
blue gray
cornflower blue
olive green
yellow olive

8C-3

(Unmarked, threadless)

CD-743.3



8C-3

8C-3

(Unmarked, threadless)

8C-1 single-threaded **8C-2** double-threaded **8C-3** threadless

The three mandrels of the **8C** mold style.

Pinch points '**B**' and '**C**' indicate that the skirt mold parts '**1**' and '**2**' extend beyond the portion of the mold part '**3**' (top plate) that forms the base. There is no pinch point at '**D**', indicating that the plunger (mold part '**4**') also formed the inside of the skirt. A mold line at '**A**' indicates that these insulators were pressed in a 2-piece mold.

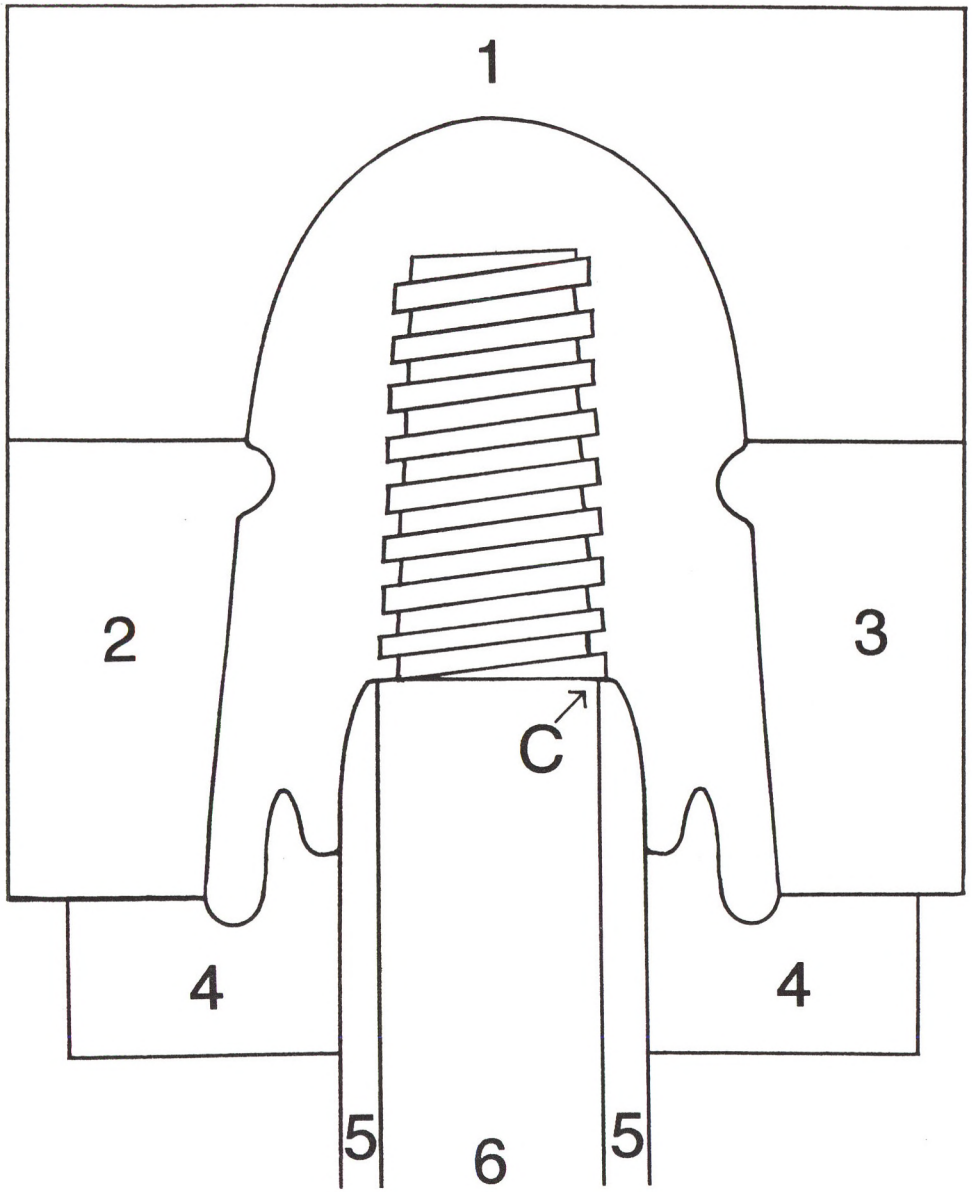
This is the threadless version of the type **8C-1** single-threaded and **8C-2** double-threaded insulator. The type 8 threadless insulators have been roughly dated from 1875 to 1880.

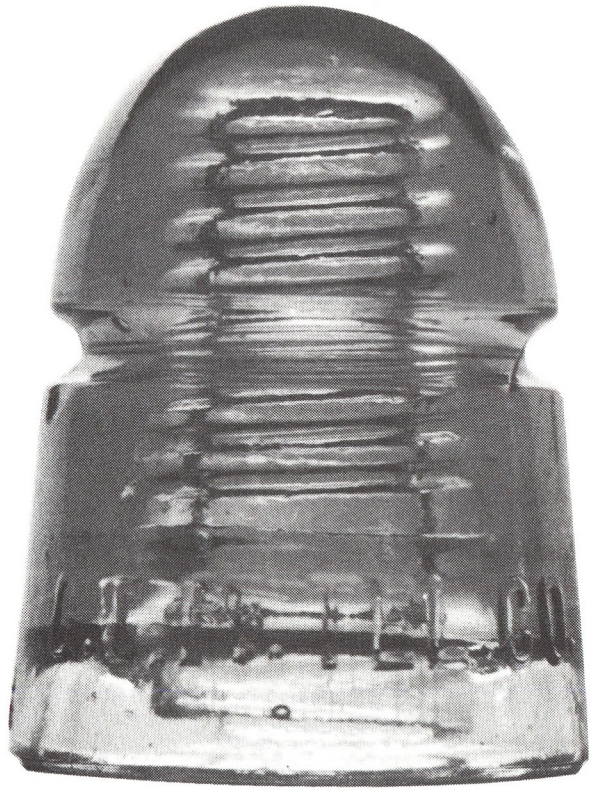
The 8C-3 threadless insulators have been found in the following colours:

aqua
light aqua

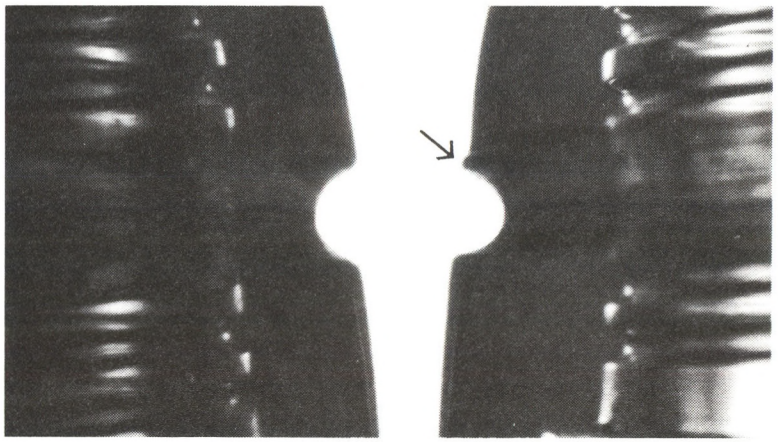
10

CD-145

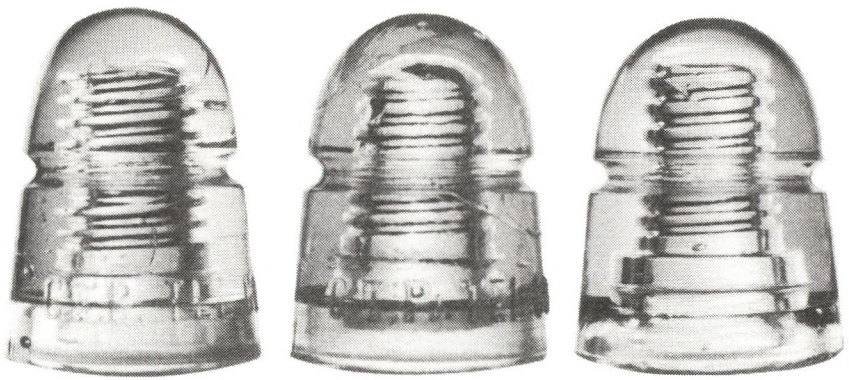




Mold style 10



The regular and the 'sharp rim' mold feature.



The three different widths of mold style 10.

Mold style 10 (CD-145) is the Canadian 'heavy telegraph double petticoat style', as described in the Dominion Glass Company catalog from the late 1920's

There are three slight variations in width in this group, and specimens with a 'sharp rim' mold feature.

The main body of this mold (mold part **1**) formed the entire 'dome' of these insulators, as no mold line is visible above the wire groove. Mold parts '**2**' and '**3**' formed the outsides of the skirt and the wire groove. The top plate (mold part **4**) formed the base and the inner skirt. The follower (mold part **5**) formed the inside of the inner skirt as far as the beginning of the threads at point '**C**'. No swirls or elongated bubbles in the glass near the threads indicate that the plunger did not rotate on insertion. The follower was also removed without turning.

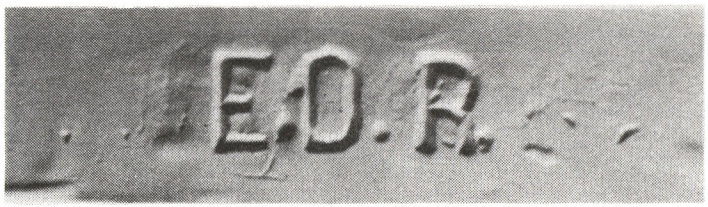
The type 10 molds are all modern three-piece molds and have no mold line over the dome. Several of the type 10 molds were engraved with railway or telegraph names, erased, and re-engraved with additional markings. The long production span of the type 10 insulators has been dated from 1900 to 1930.

Mold Style 10

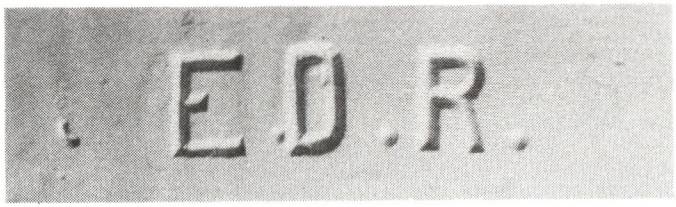
10-A E.D.R.
10-B G.N.W. TEL.CO. and **G.N.W. TEL. Co.**
10-C G.T.P.
10-D G.T.P. TEL. CO.
10-E G.T.P. TEL. Co.
10-F H.B.R.
10-G T.C.R.
10-H (Blot-outs and Un-marked)

10-A

E.D.R.



10A-5 E.D.R. over blot-out.



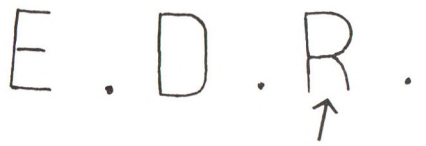
10A-2 E.D.R. over blot-out.

The **E.D.R.** insulators have been found in the following colours:

Light green-aqua
Light aqua
Light blue-aqua

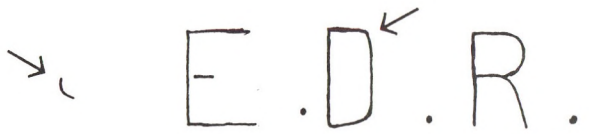
10A-4

No blot-out, narrow '**R**'.



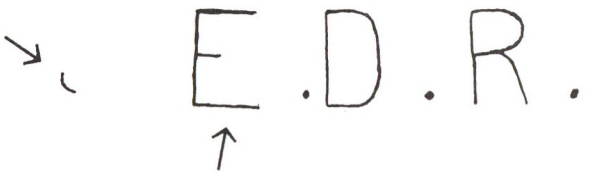
10-A1

Large thin '**D**', backwards comma as part of blot-out.



10-A2

Large wide '**E**', backwards comma as part of blot-out.

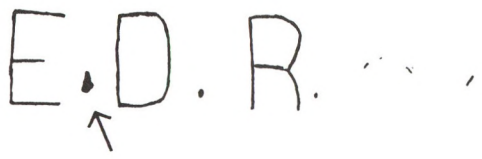


10-A3

Small '**DR**', embossing over blot-out.

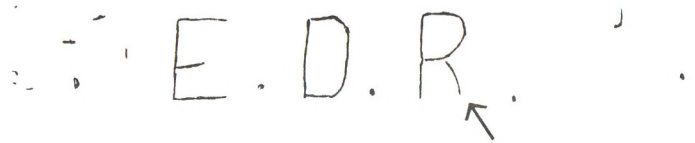
10-A4

Large blob on high '**E**' period, embossing over blot-out.



10-A5

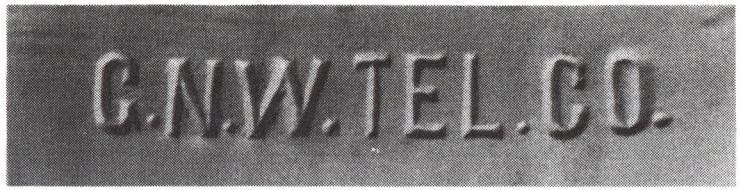
Small '**R**' leg, embossing
over blot-out.



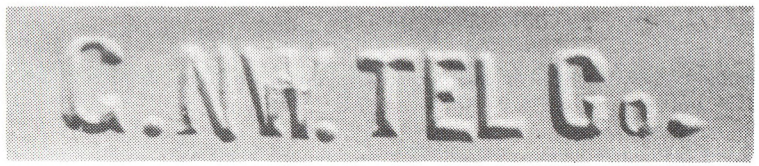
10-A6

10-B

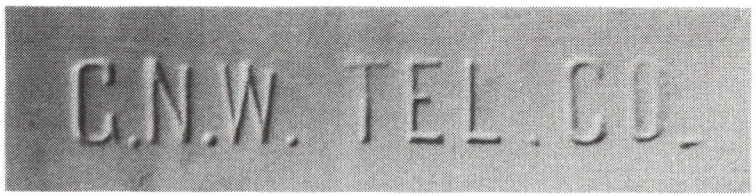
G.N.W. TEL. CO.
G.N.W. TEL Co.



10B-2 G.N.W TEL. CO. (Thick embossing)



10B-5 G.N.W. TEL Co. (Small '**o**' in '**Co**'.)

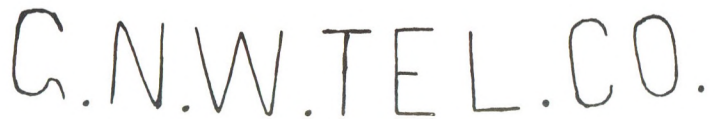
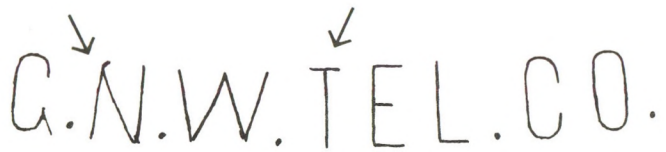
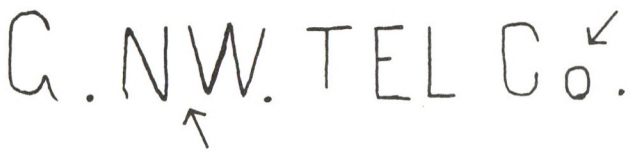
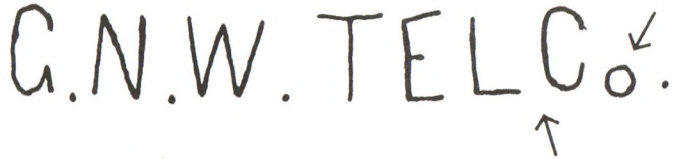


10B-3 G.N.W. TEL. CO. (Thin embossing)

10B-1

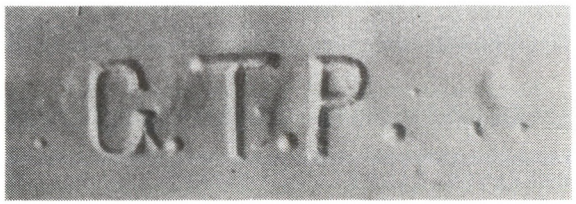
The **G.N.W.TEL.CO.** insulators are found in the following colours:

purple
royal purple
light aqua
light green
ice blue
light blue
steel blue

Wide embossing, large letters.		**10-B1**
Small '**T**' bar, uneven '**N**'.		**10-B2**
Short '**N**' bar, narrow '**O**'.		**10-B3**
Small '**O**', no period after '**N**' or '**TEL**'.		**10-B4**
Small 'O', no period after '**TEL**'.		**10-B5**

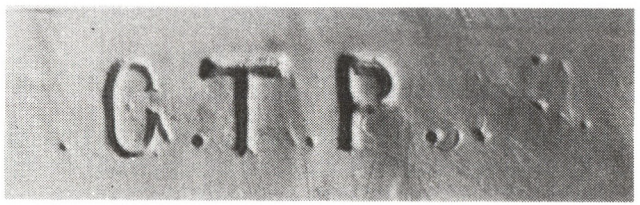
10-C

G.T.P.



10C-2 G.T.P. (Over blot-out)

10C-5 G.T.P. (No blot-out)

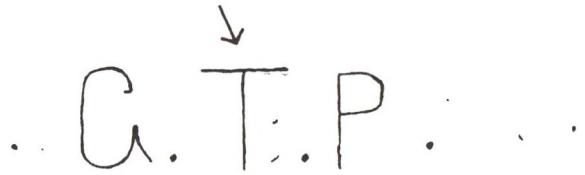
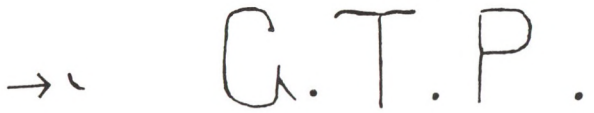
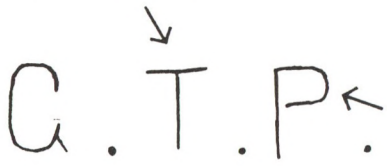
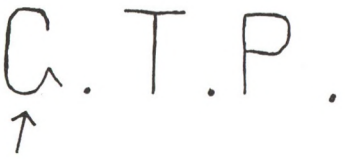


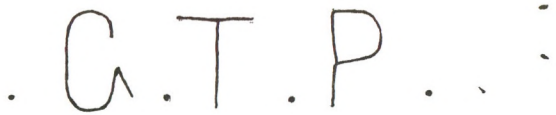
10C-7 G.T.P. (Over blot-out)

The **G.T.P.** insulators are found in the following colours:

light aqua	light green
steel aqua	light lavender
light blue	lavender
steel blue	purple tint

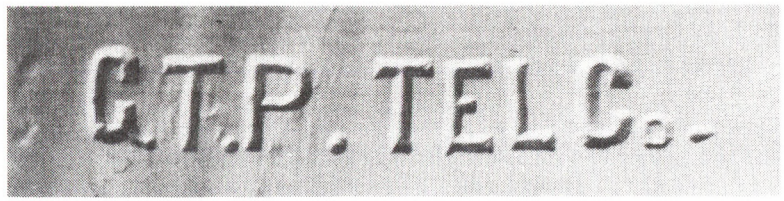
10C-2

Embossing over blot-out.		**10-C1**
Large '**T**', embossing over blot-out.		**10-C2**
Backwards comma as part of blot-out.		**10-C3**
Small '**T**', small '**P**' loop, no visible blot-out.		**10-C4**
Small '**G**', no visible blot-out.		**10-C5**

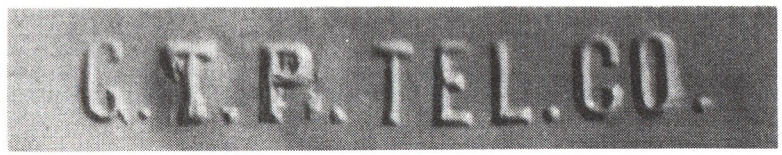
Embossing over faint blot-out.		**10-C6**
Embossing over blot-out.		**10-C7**
Embossing over faint blot-out.		**10-C8**

10-D
10-E

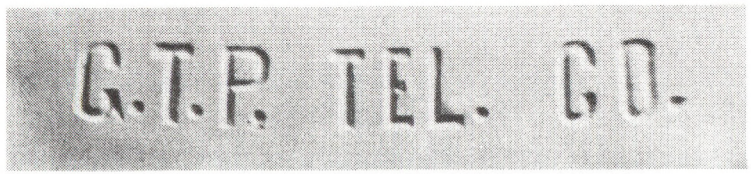
G.T.P. TEL. CO.
G.T.P. TEL. Co.



10E-1 G.T.P. TEL Co. (small '**o**' in '**Co**')



10D-7 G.T.P. TEL. CO. ('**G.T.P.**' over blot-out of '**G.N.W.**')

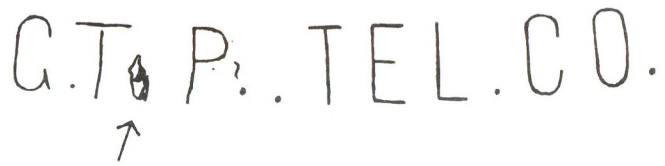
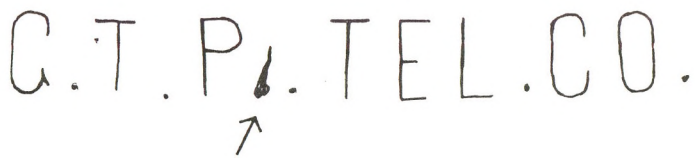
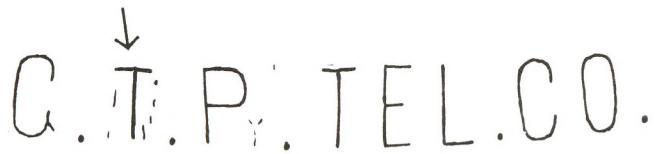


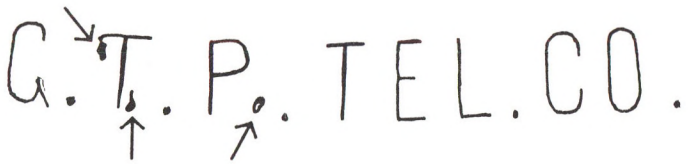
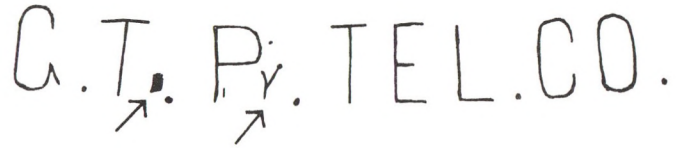
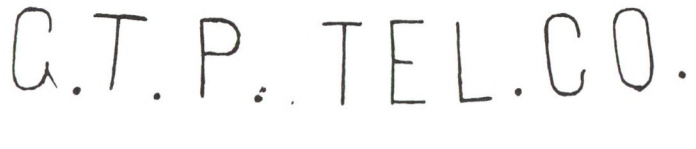
10D-5 G.T.P. TEL. CO (no blot-out).

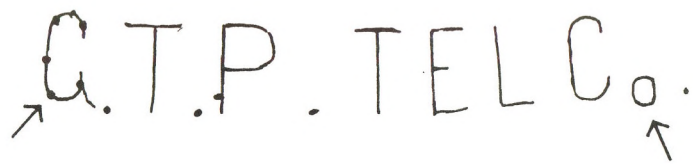
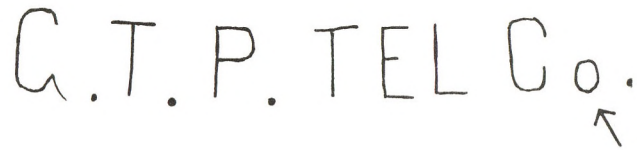
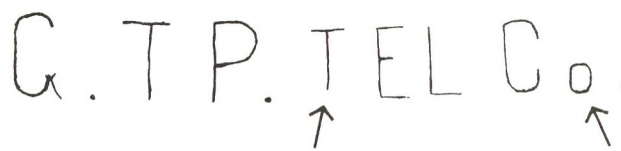
The **G.T.P.TEL. CO** and **G.T.P. TEL. Co.** insulators are found in the following colours:

light aqua	ice blue	delft blue	light gray
steel aqua	off clear	light purple	lavendar
light blue	purple tint	steel blue	green aqua
blue lavendar	medium aqua	blue	

10D-2

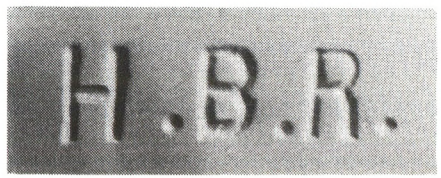
Big blob on '**T**' period,'**TP**' over blot-out of '**NW**'.		**10-D1**
'**TP**' over blot-out of '**NW**'.		**10-D2**
Narrow '**T**' bar in '**GTP**', '**TP**' over blot-out of '**NW**'.		**10-D3**
'**TP**' over blot-out of '**NW**'.		**10-D4**
Very thin '**TEL**', no visible blot-out.		**10-D5**

Very faint blot-out.		**10-D6**
Note locations of erasure attempts, '**TP**' over blot-out of '**NW**'.		**10-D7**
Note locations of erasure attempts, '**TP**' over blot-out of '**NW**'.		**10-D8**
Note locations of erasure attempt, '**TP**' over blot-out of '**NW**'.		**10-D9**
Square '**G**' curves, narrow '**O**', '**TP**' over blot-out of '**NW**'.		**10-D10**

Wide space between '**T**' and '**P**", '**TP**' over blot-out of '**NW**'.		**10-D11**
Small '**O**' in '**Co**', raised dots on the '**G**'.		**10-E1**
Small '**O**' in '**Co**', shorter, thick embossing, small '**P**' loop.		**10-E2**
Small '**O**' in '**Co**', short '**T**' in 'TEL'.		**10-E3**

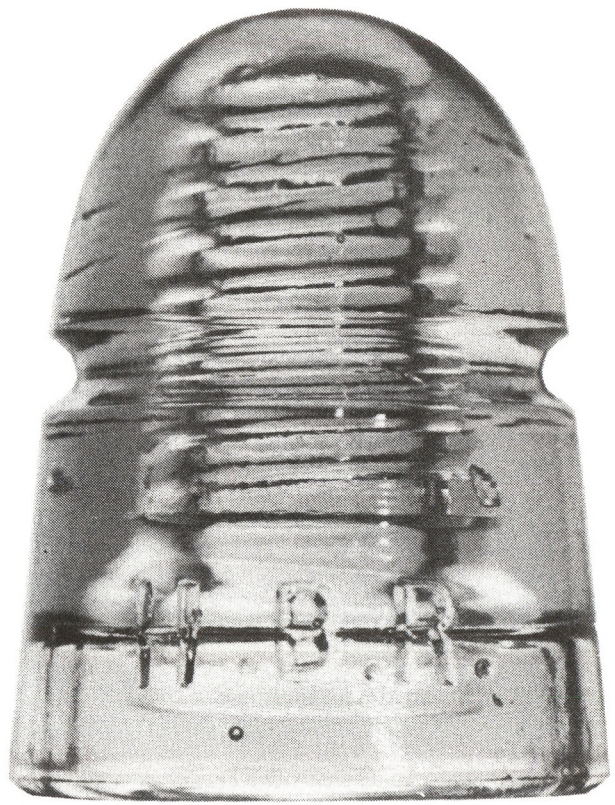
10-F

H.B.R.



10F-1 H.B.R. (no blot-out)

10F-5 H.B.R. (over blot-out)



10F-2

The **H.B.R.** insulators have been found in the following colours:

light aqua
aqua
ice blue
light blue

No visible blot-out.

10-F1

Note locations
of erasure attempt.

10-F2

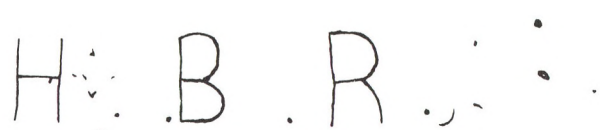
Note locations
of erasure attempt.

10-F3

Note locations
of erasure attempt.

10-F4

Note locations
of erasure attempt.



10-F5

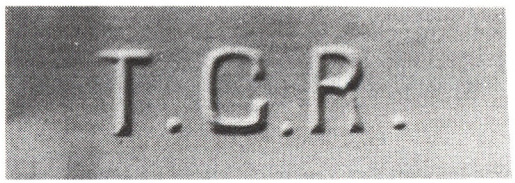
Wide '**B**', parallel '**R**' legs.

10-F6

10-G

T.C.R.

10G-6 T.C.R. (over blot-out)



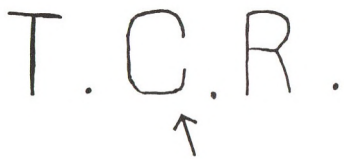
10G-8 T.C.R. (no blot-out)

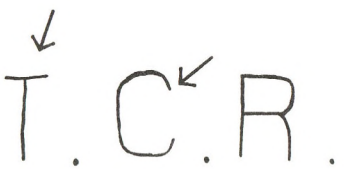
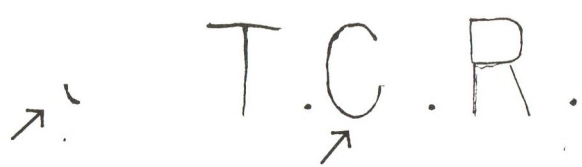
10G-2

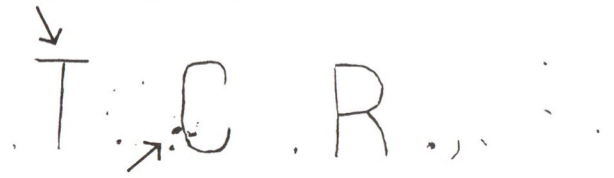
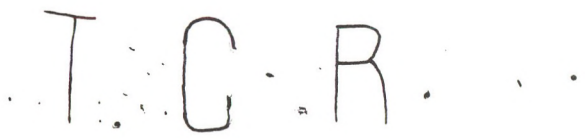
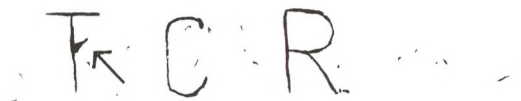
The **T.C.R.** insulators are found in the following colours:

light aqua	blue
light blue	light gray blue
light purple	light blue aqua

Note locations of erasure attempt.		**10-G1**
Note locations of erasure attempt.		**10-G2**
Note locations of erasure attempt.		**10-G3**
Note locations of erasure attempt.		**10-G4**
Note locations of erasure attempt.		**10-G5**

Note locations of erasure attempt.		**10-G6**
Faint blot-out.		**10-G7**
No visible blot-out, flat 'C' bottom.		**10-G8**
No visible blot-out.		**10-G9**
No visible blot-out.		**10-G10**

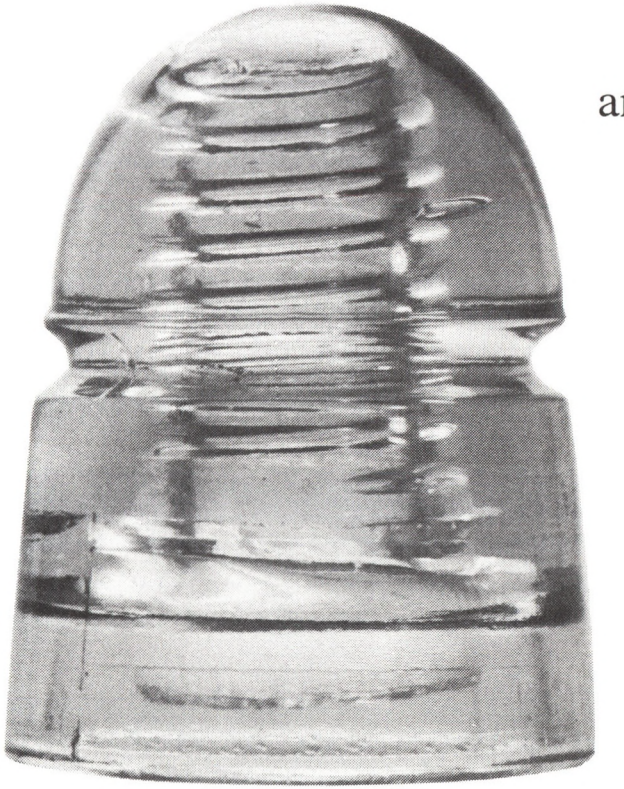
No visible blot-out.		**10-G11**
No visible blot-out.		**10-G12**
Uneven '**C**', narrow '**T**' bar.		**10-G13**
The '**C**' has a small lip on the lower arm. Note locations of blot-out.		**10-G14**
Backwards comma as part of blot-out. Round '**C**', large '**R**'.		**10-G15**

Raised dots around the '**C**', narrow '**T**' bar. Embossing over blot-out.		**10-G16**
Very tall thin '**C**' and '**T**', small '**R**' loop. Embossing over blot-out.		**10-G17**
Small raised area on the side of the '**T**'. No visible blot-out.		**10-G18**
Small raised area on the side of the '**T**', Embossing over blot-out. No periods.		**10-G19**

10-H

Blot-outs and Unmarked

'G.N.W. TEL. CO.' blot-out.

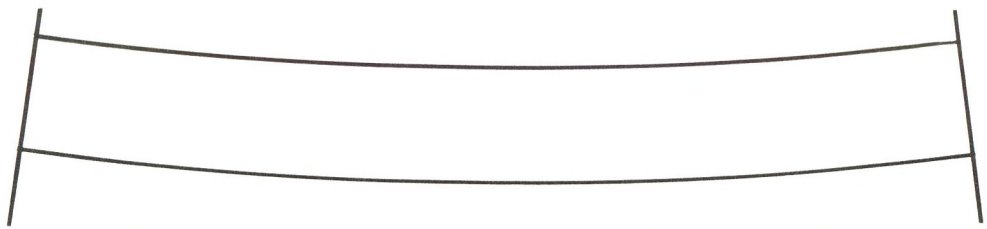
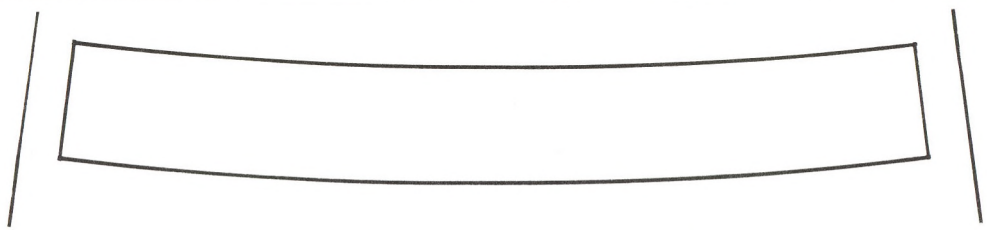


Type 10H (unmarked)

Recessed band blot-out.

The **unmarked** type 10 insulators have been found in the following colours:

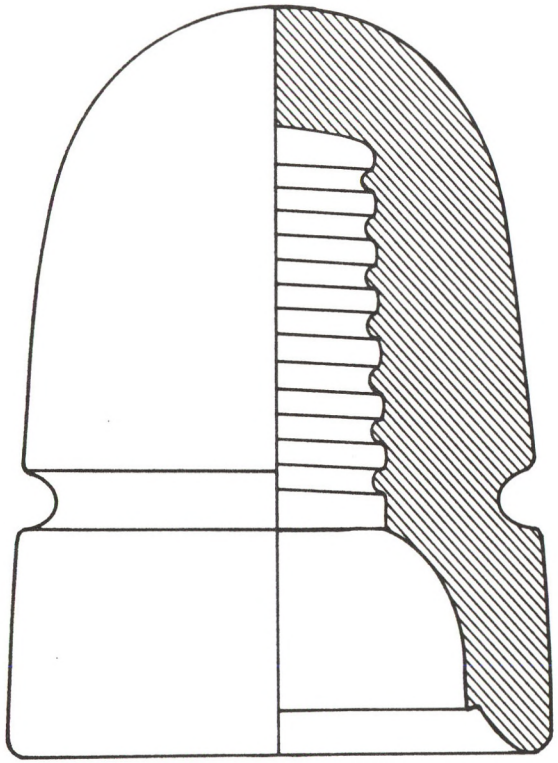
light straw	light pink	lt green with white milk
straw	peach	
dark straw	light green	

Very faint **'G.N.W. TEL. CO.'** blot out.		**10-H1**
Recessed band blot-out.		**10-H2**
Recessed band blot-out, re-worked mold. (Band ends before mold lines)		**10-H3**
	(No Embossing)	**10-H4**

13

A.E.R.
C.N.R.
C.P.R.
T. & N.O.RY.

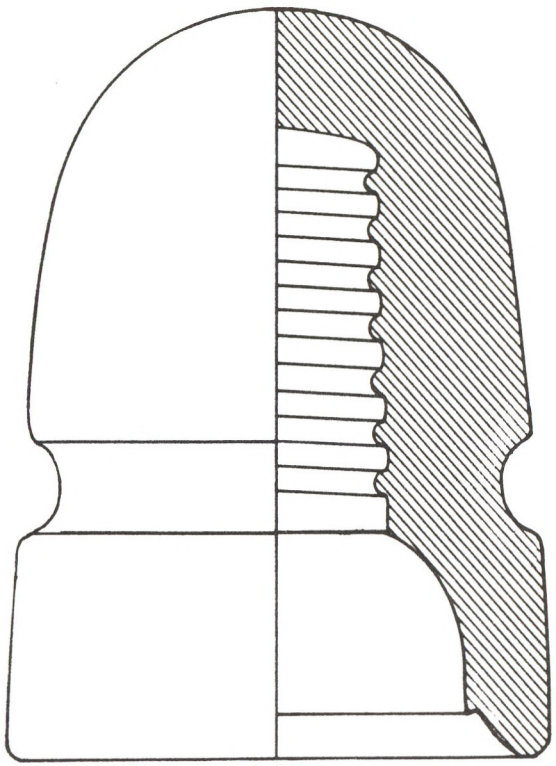
U-1131A



13

A.E.R.
C.N.R.
C.P.R.
T. & N.O.RY.

U-1131

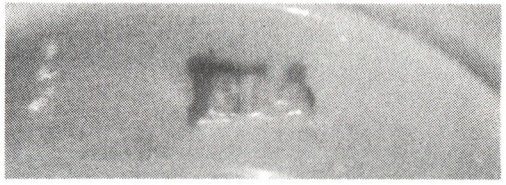


13

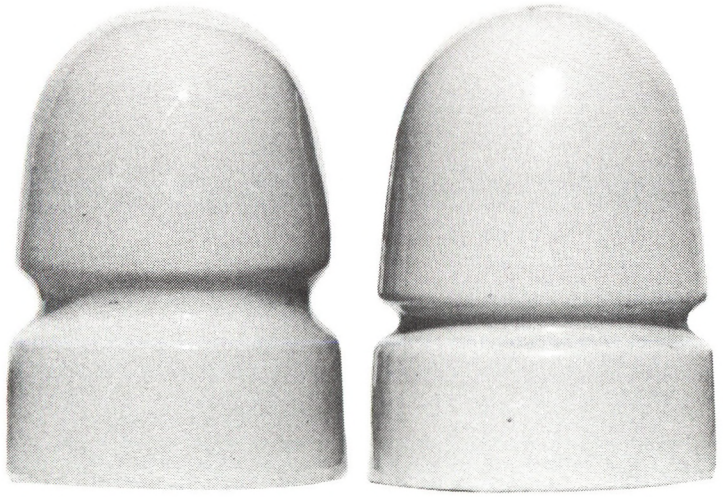
A.E.R.
C.N.R.
C.P.R.
T. & N.O.RY.

The various type 13 insulator markings:

13-A A.E.R. Green underglaze on dome top.
13-B C.N.R. Green underglaze on dome top.
13-C C.N.R. Green underglaze on skirt side.
13-D C.P.R. Small green underglaze on dome top.
13-E C.P.R. Large green underglaze on dome top.
13-F T. & N.O. RY. Green underglaze on dome top.
13-G T. & N.O. Ry. Green underglaze on skirt side.
13-H T. & N.O. RLY. Green underglaze on skirt side.



The numbers found on the inside skirt or base.



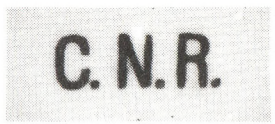
Different wire groove profiles of the type 13 insulators.

The type 13 porcelain insulators were imported from Europe in the early 1900s. A recent excavation of a dump site from an old porcelain factory in Czechoslovakia uncovered several pieces and whole units of these green underglaze marked insulators. Several different green underglaze markings share this mold style. They were made to Canadian railway telegraph specifications, and imitate the CD-143 type 1-C glass insulators with the tipped-in base. They do not have the familiar 'Gisborne grooved base' that other (imported British) porcelain styles have. They were made by the wet-process and are of very high quality. They were clear-glazed over white porcelain. This white porcelain often appears to have a white underglaze applied before the marking and clear overglaze was applied. The base and inside skirt was also glazed.

Most C.N.R. and some C.P.R. marked items in this style have a much larger wire groove. This groove begins higher on the dome side and ends on the skirt side at the same location as the small wire groove variety.

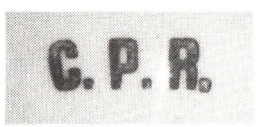
Most items were incuse stamped with a batch or inspection number on the base or inside skirt.

13-A A.E.R. Green underglaze, marked on dome top.



13-B C.N.R. Green underglaze, marked on dome top.

13-C C.N.R. Green underglaze marking on skirt side.
(Item reported and illustrated in the 1973 Gauchi-McDonald study, although no example could be located.)

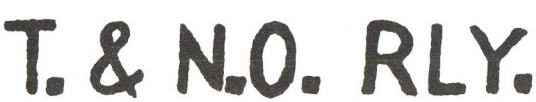


13-D C.P.R. Small green underglaze marking on dome top.

13-E C.P.R. Large green underglaze marking on dome top.

13-F T. & N.O. RY. Green underglaze on dome top.

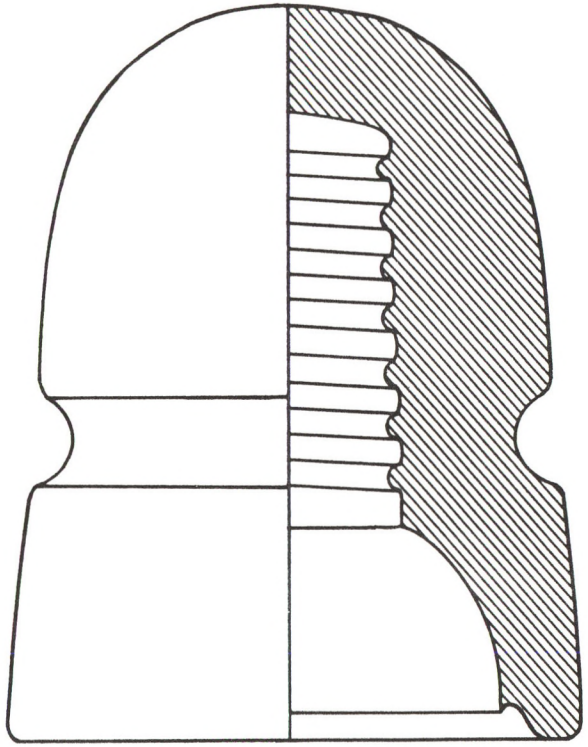
13-G T. & N.O. Ry. Green underglaze on skirt side.



13-H T. & N.O. RLY. Green underglaze on skirt side.
(This item has been illustrated and reported to exist since at least 1976, although no example could be located.)

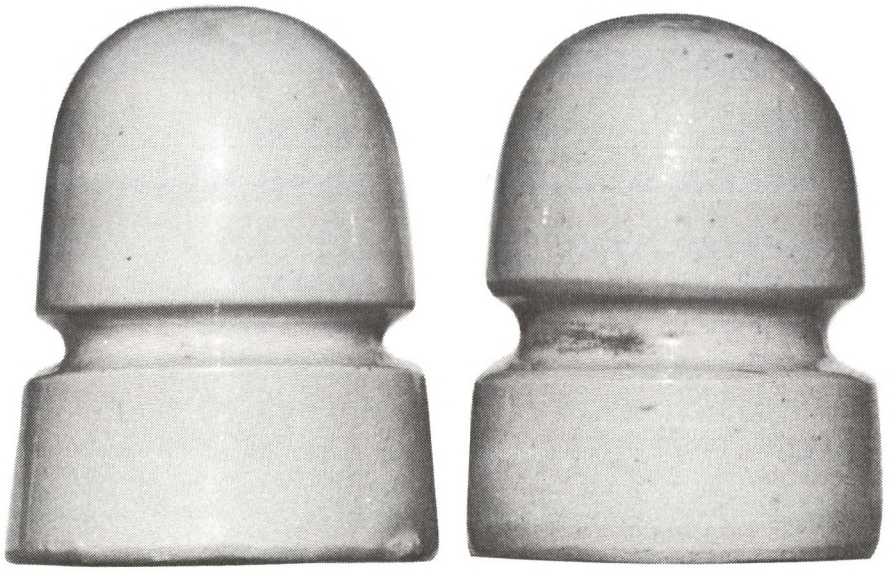
14-A

C.N.R.
C.P.R.
(Unmarked)
U-1131



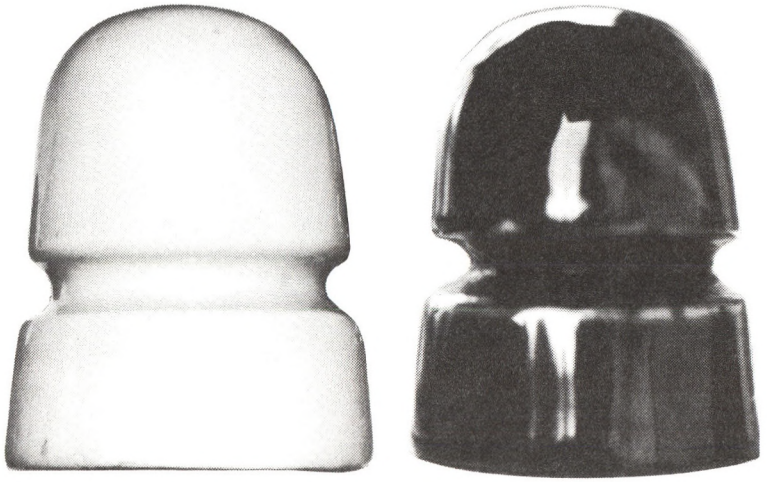
14-A

C.N.R.
C.P.R.
(Unmarked)



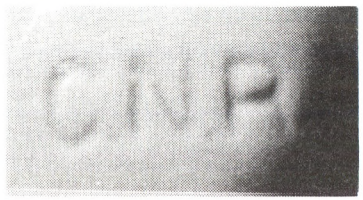
Different profiles of the type 14-A C.N.R. incuse marked items.

14A-1 **C.N.R.** 'pencil' incuse embossing.
14A-2 **C.N.R.** brown 'pencil' incuse embossing.
14A-3 **C.N.R.** incuse marking (small lettering)
14A-4 **C.N.R.** incuse marking (large lettering)
14A-5 **C.N.R.** small lettering stamped over C.P.R. 'pencil' marking.
14A-6 **C.P.R.** 'pencil' incuse embossing.
14A-7 Unmarked.

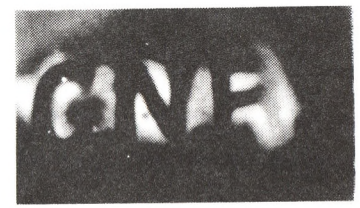


The type 14-A white and scarce brown porcelain insulator.

The type 14 porcelain insulators were manufactured sometime shortly after 1908 by the Pittsburg High Voltage Insulator Company in Derry, Pennsylvania. An excavation of the dump site from the porcelain factory revealed several pieces and whole units of these incuse marked C.P.R. and C.N.R. insulators. Although they were also wet-process made, they are quite different from the type-13 European insulators. The bases look as if they were trimmed off with a knife. The inside skirts were glazed, the bases were not. These items generally have unglazed pin-holes, although there are several specimens with glazed pin-holes. They were clear-glazed over white porcelain. Only one or two brown glazed specimens are known to exist. They appear with several different markings and have also been found with no marking.

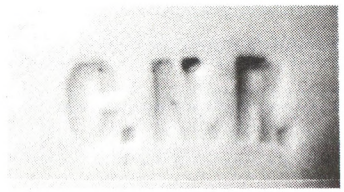


14A-1 C.N.R. 'pencil' incuse embossing.

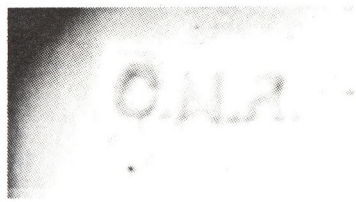


14A-2 C.N.R. brown 'pencil' incuse embossing.

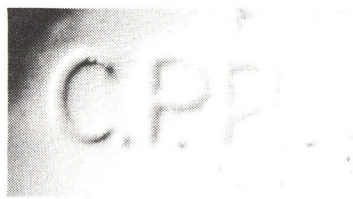
14A-3 C.N.R. incuse marking (small lettering)



14A-4 C.N.R. incuse marking (large lettering)



14A-5 C.N.R. small lettering stamped over C.P.R. 'pencil' marking.

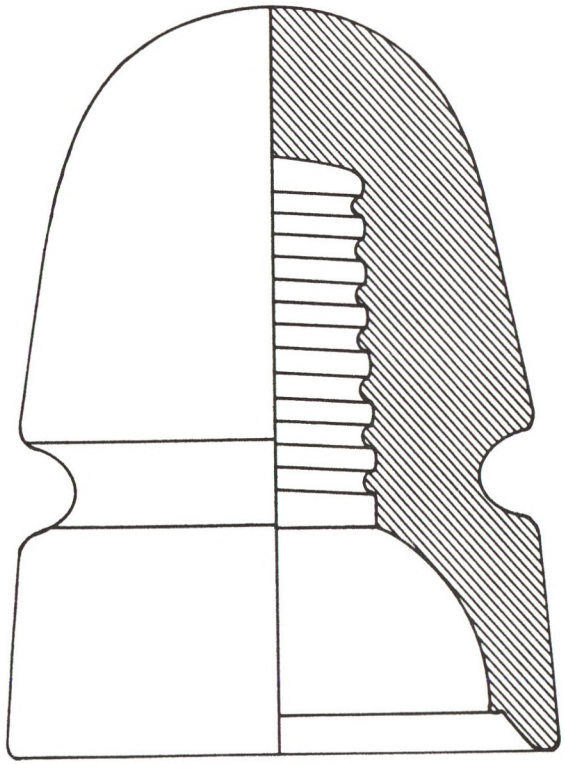


14A-6 C.P.R. 'pencil' incuse embossing.

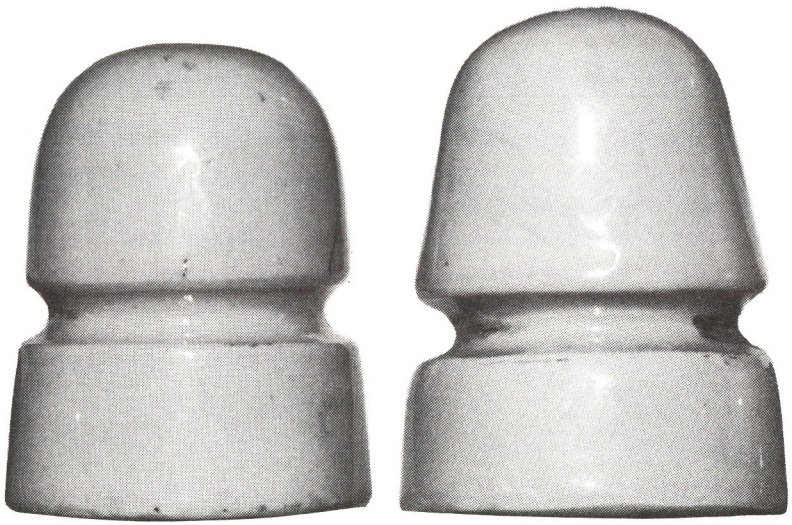
14-B

C.N.R.

U-1131



14-B
C.N.R.



14-A C.N.R. **14-B C.N.R.**
Profiles of the type 14-A and 14-B insulators.

The type 14-B porcelain insulators were also manufactured by the Pittsburg High Voltage Insulator Company in Derry, Pennsylvania. Although they were also wet-process made, they are a different shape than the type 14-A items. This item also has a glazed inside skirt and an unglazed base and pin-hole.

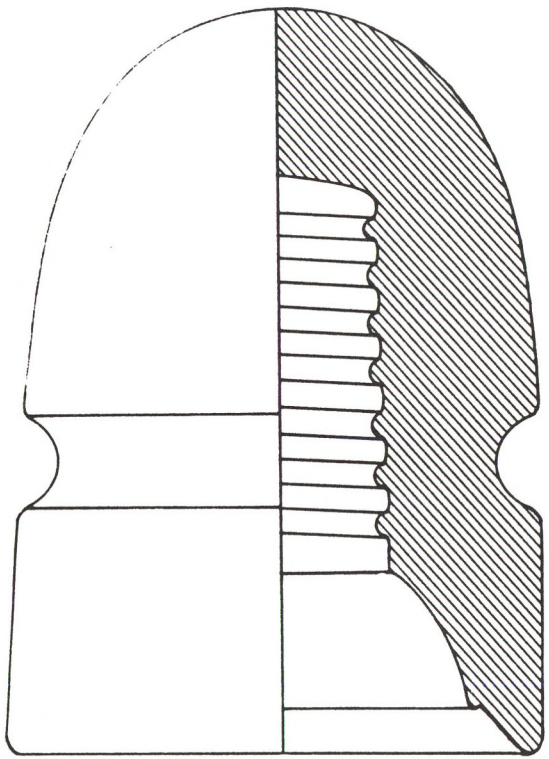
As several of these have been located, it is unlikely that this shape was simply a type 14-A production error.

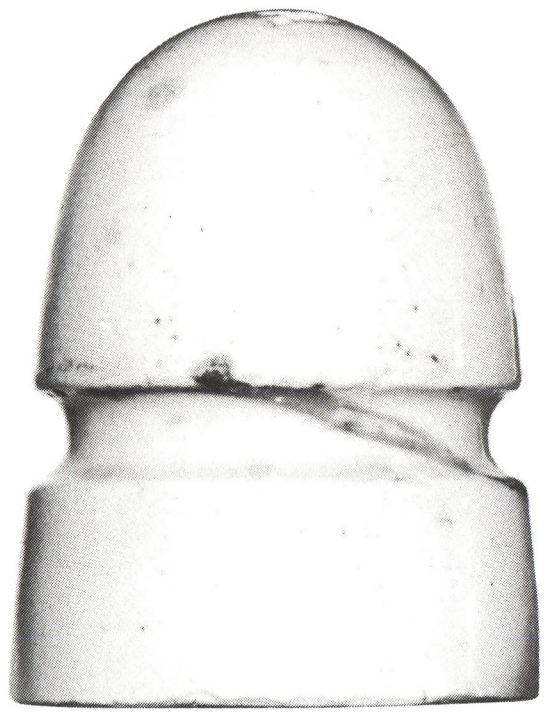
The type 14-B incuse dome top marking is larger than the 14A C.N.R. marking.

15-A

C.N.R.

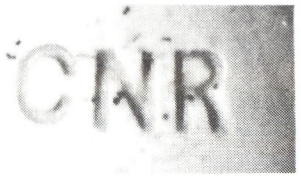
U-1131



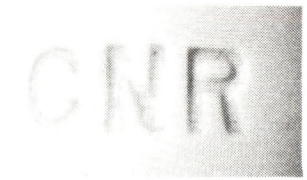


15-A

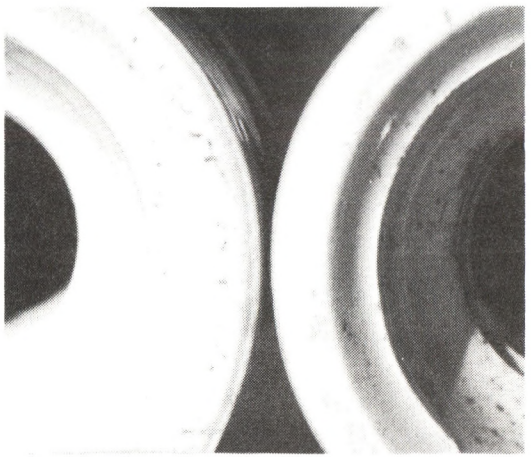
C.N.R.



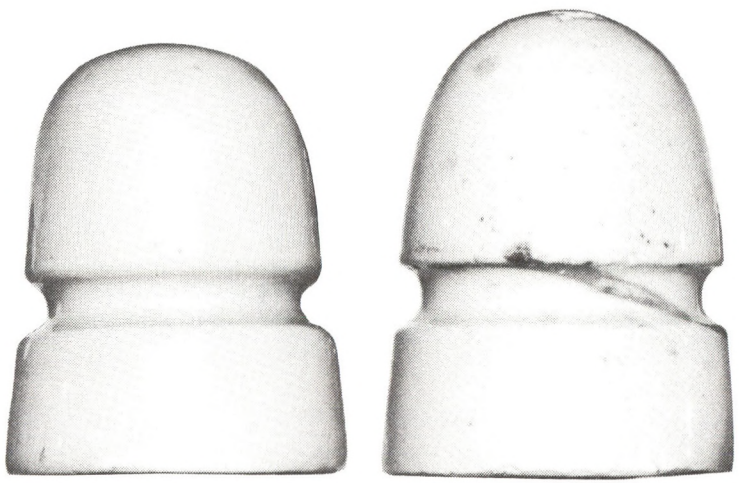
15A-1 C.N.R. incuse marking on dome top. Note there are no periods in these dry-process markings.



15A-2 C.N.R. incuse marking on dome top. This marking has a thin '**C**' and heavier '**NR**' than the above stamp.



15-A dry process base and **14-A** wet-process base. (Note the small cracks in the porcelain in the dry-process item.)



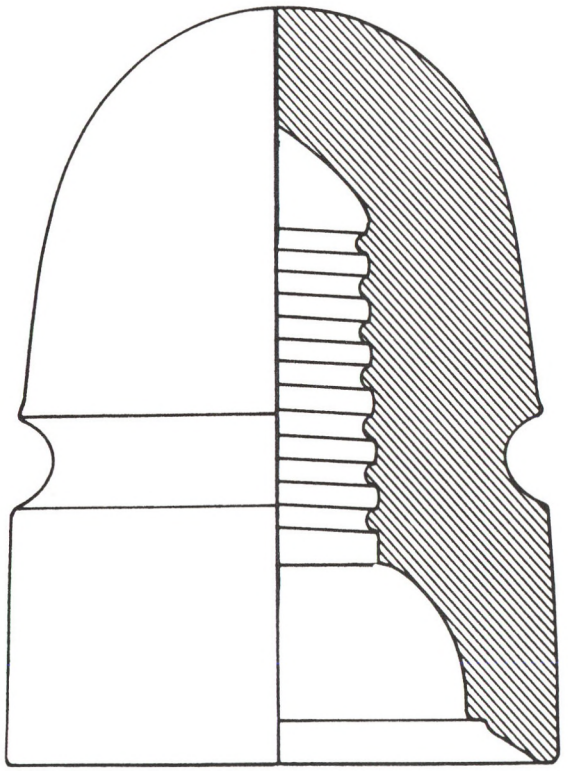
The type **14-A** wet process and the type **15-A** dry process **C.N.R.** incuse marked insulators

Although the 15-A and 15-B were dry-process made, they are similar to the type 14 wet-process Pittsburg-made items. The 15-A insulators are the typical white porcelain with clear glaze. Small cracks can be seen through the clear glaze where the porcelain was not thoroughly compressed during forming. The bases of this style were not glazed, but the entire inside skirts and pin-holes were.

15-B

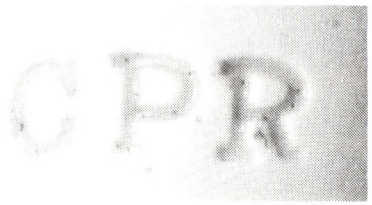
C.P.R.

U-1131



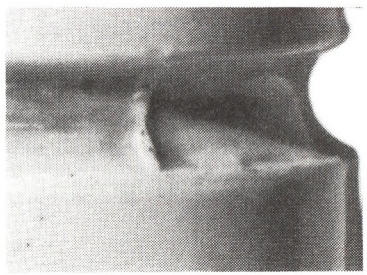
15-B

C.P.R.

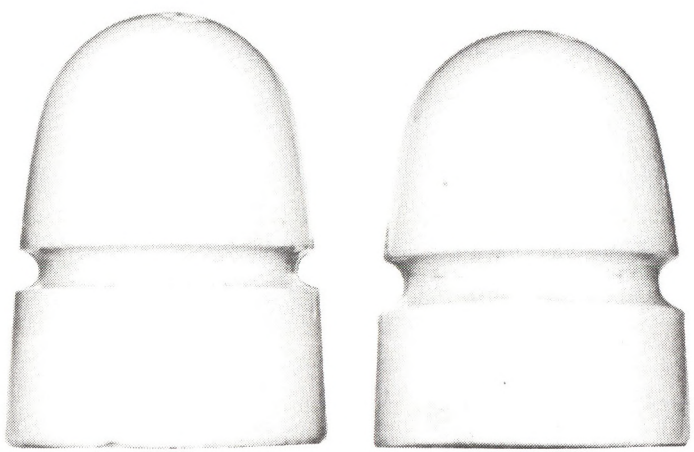


Twice original size.

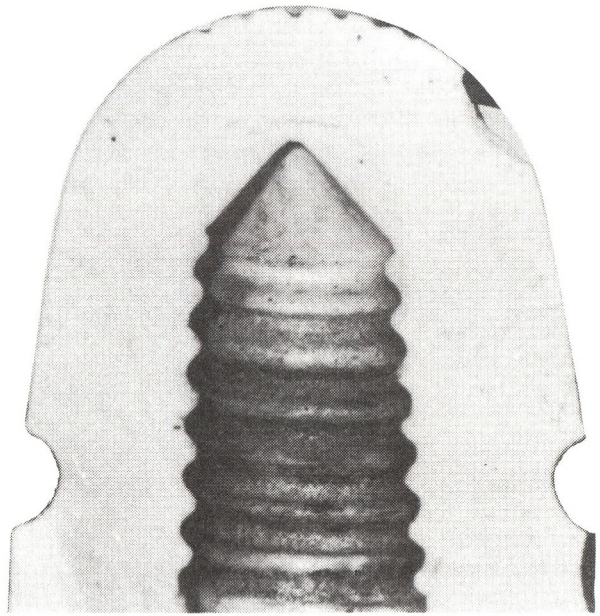
15-B dry-process CPR incuse marking on the dome top. (Note there are no periods in the dry-process incuse markings.)



A mold line can often be found in the wire groove of the **15-B** dry-process CPR.



15-A dry-process CNR and **15-B** dry-process CPR.



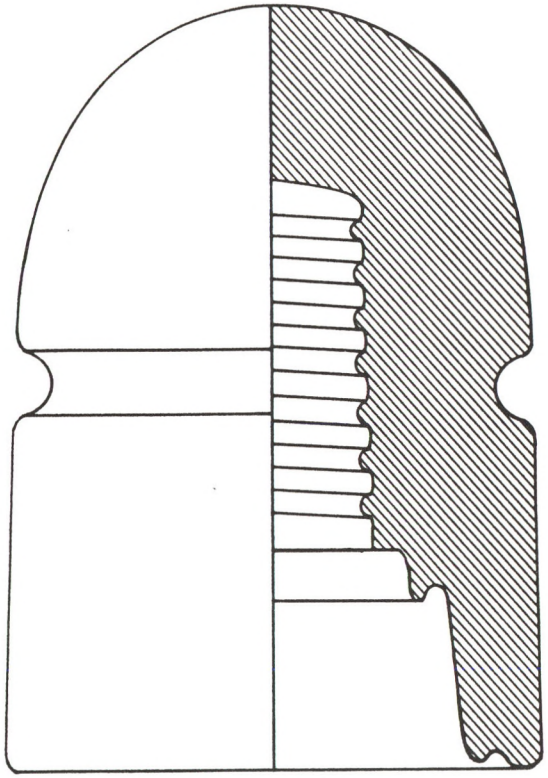
15-B pin-hole. (Specimen was cut in half to demonstrate the point in the top of the pin-hole.)

The 15-B insulators were also dry-process made of white porcelain with a clear glaze. Small cracks can be seen through the clear glaze where the porcelain was not thoroughly compressed during forming. The inside skirt in this style was glazed, the base and pin-hole were not. A mold line can often be seen in the wire groove of this style. There must have been more that one mold used to manufacture these items, because there are differences in the location and size of the wire grooves. A pointed top is typically found in the pin-hole in this style. The dry-process type-21 "Yukon Telegraph" insulators also have this feature, and were perhaps manufactured by the same company.

16

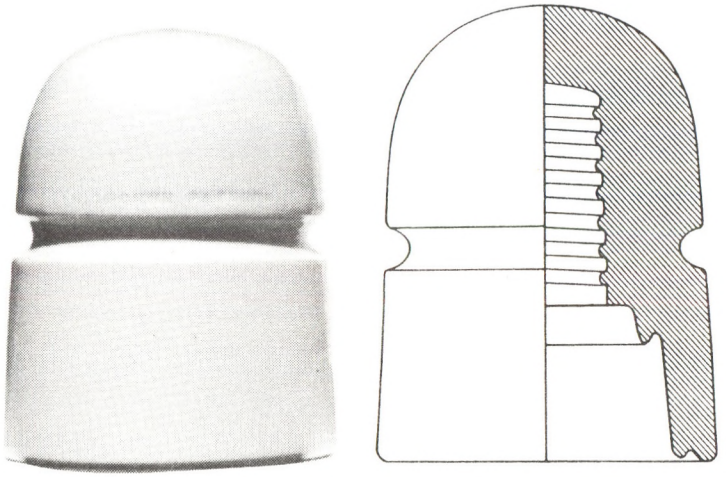
GISBORNE PATTERN

U-1130A, U-1135 and U-1137

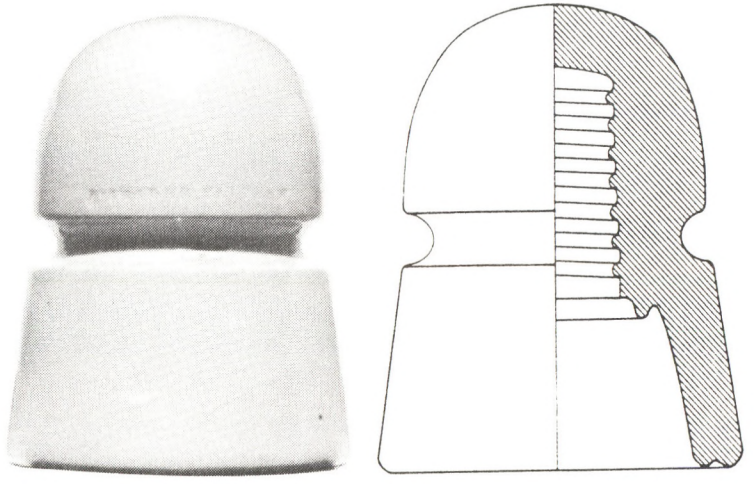


16

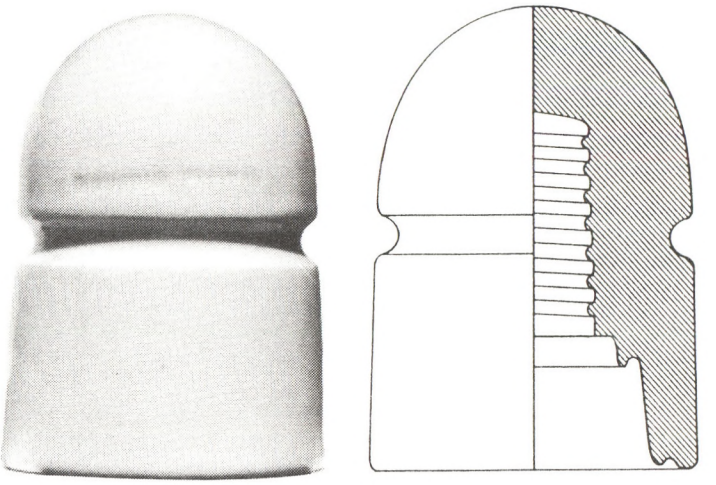
GISBORNE PATTERN



16-A U-1137



16-B U- 1130A



16-C, D and **E** U-1135

The type 16 porcelain 'Gisborne Pattern' insulators were manufactured by Bullers in London, England. The 1890-95 Buller Jobson Co. catalog offered 'Gisborne's Canadian' and 'Gisborne Pattern' insulators. They have the 'Gisborne grooved base', and are white porcelain with a clear glaze. A brown glazed item is also suggested to exist. The base and inside skirt were glazed and were manufactured by the wet-process. These insulators fall into three separate groupings, and are varied in design and marking. The markings are all incuse, stamped above the wire groove and visible through the clear glaze. Most of these Gisborne insulators also have a batch or inspection number stamped on the inside skirt.

16
GISBORNE PATTERN

16-A Small upper-case lettering, no serifs.

16-B Small upper-case lettering with serifs, period between 'GISBORNE' and 'PATTERN'.

16-C Large upper-case lettering, 'GISBORNE' over 'PATTERN'.

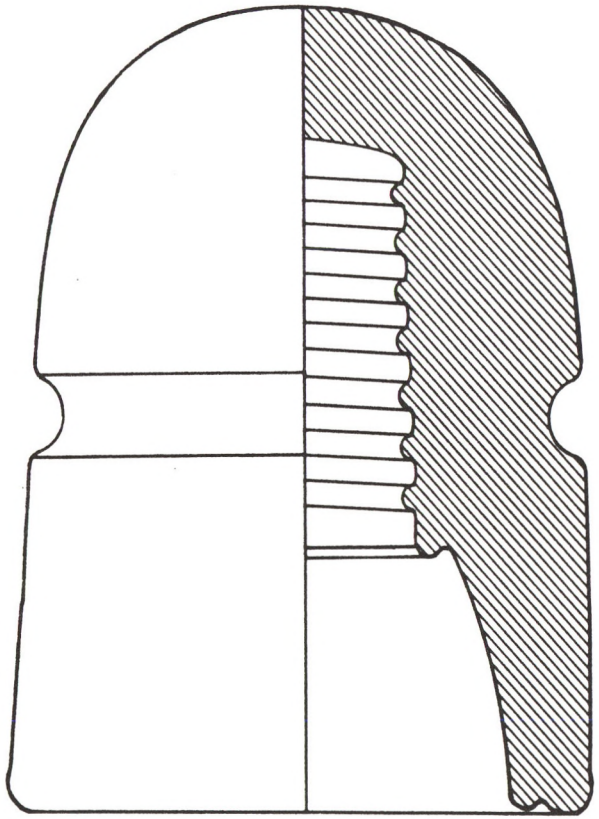
16-D Large Upper-case lettering, larger first letters on both words.

16-E Very large upper and lower-case lettering, period after 'PATTERN'.

17

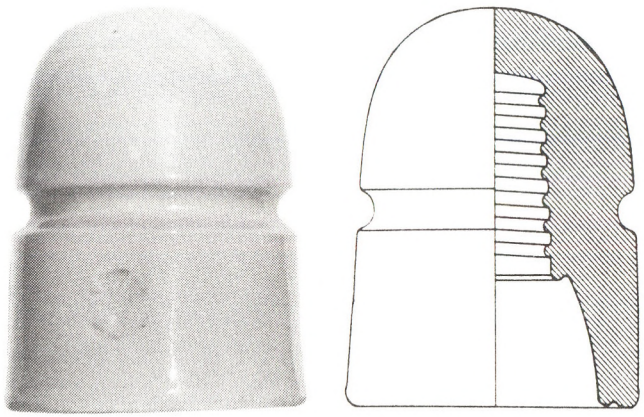
BULLERS,
(Unmarked)

U-1135 and U-1137

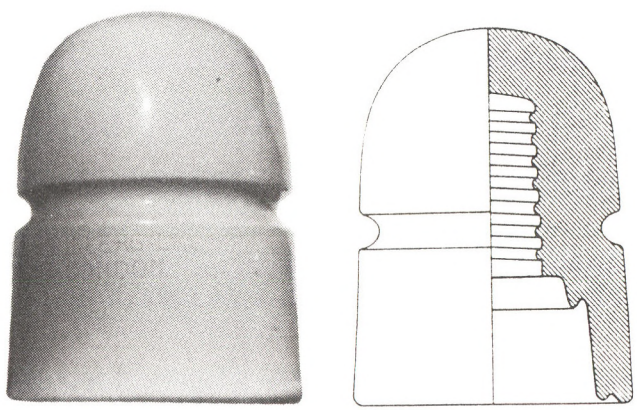


17

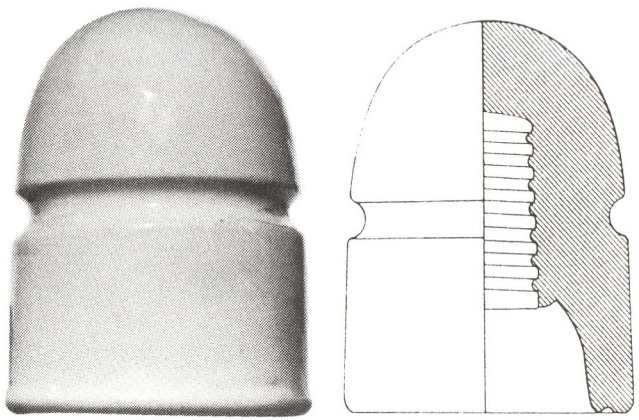
BULLERS, *(Unmarked)*



17-A Bullers Trademark U-1135



17-B Bullers Ltd., London U-1137

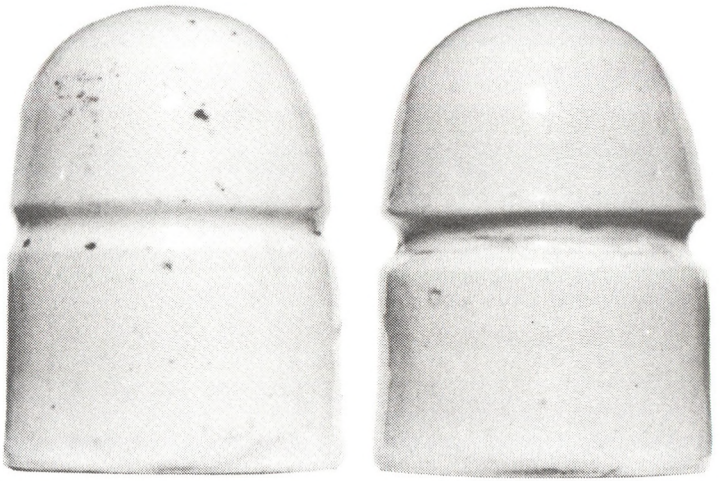


17-C unmarked Bullers U-1135

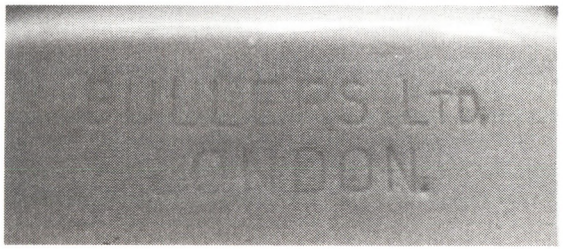
The type 17 porcelain insulators were manufactured in England by Bullers. The 1890-95 Buller Jobson Co. catalog illustration offered 'Gisborne's Canadian' and 'Gisborne Pattern' insulators. As they all include the 'Gisborne grooved base', they were made to Canadian railway telegraph specifications, and were imported for that use. They are white porcelain with thick clear glaze, and were made by the wet-process. The base and inside skirts were glazed. The pin-holes were not glazed. The **17-A** items have a slightly flared skirt at the base. The **17-A** and **17-C** items were very crudely made and have an uneven 'chunky' appearance. The **17-B** items were very well made. The **17-C** unmarked items often have a very shallow wire groove. These **17-C** items have a thick white glaze, with a clear underglaze on the base.

17
BULLERS,
(Unmarked)

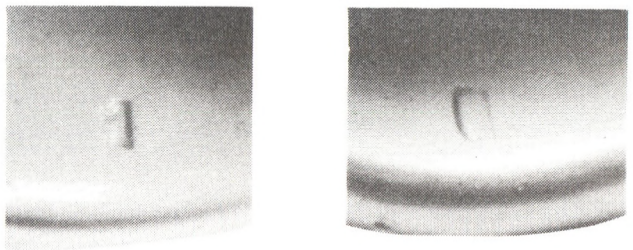
17-A Bullers trademark



The **17-C** unmarked Bullers often have shallow wire grooves.



17-B BULLERS incuse marking.

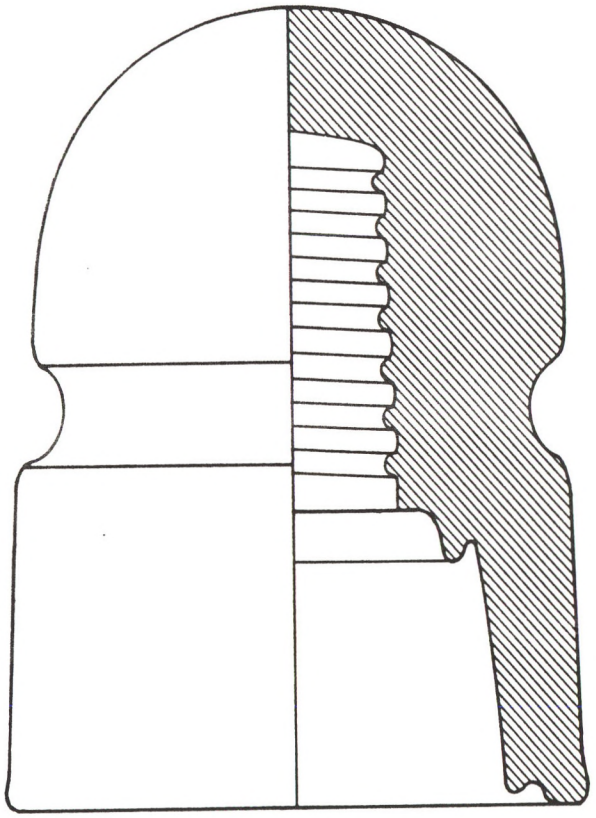


Inspection or batch numbers found on some **17-A** items.

18

HESCHO,
(HERMSDORF),
296,
(Unmarked)

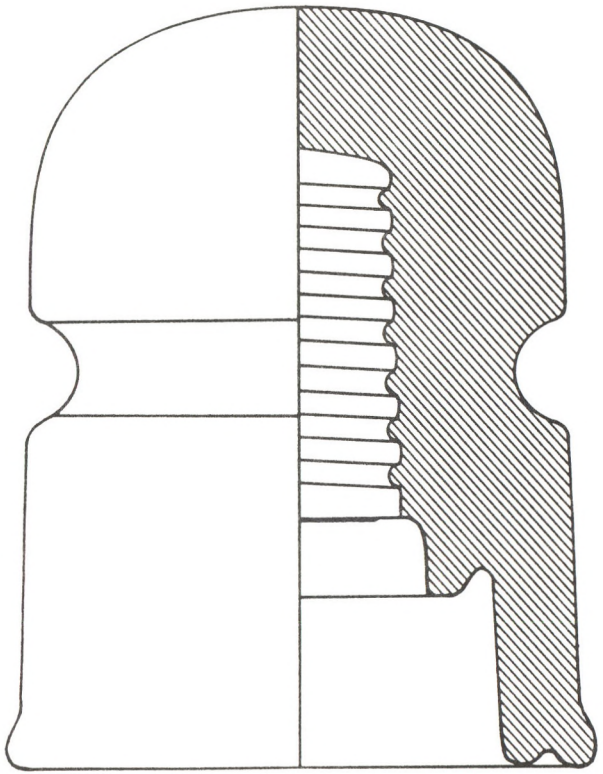
U-1138A



18

HESCHO,
(HERMSDORF),
296,
(Unmarked)

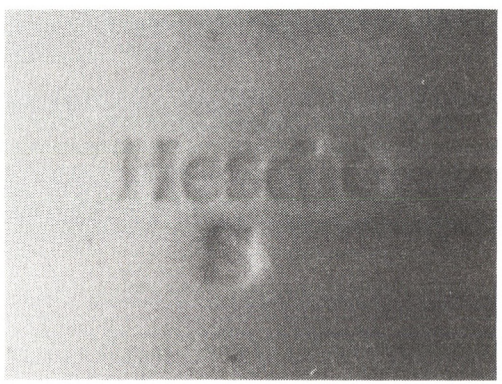
U-1138



18

HESCHO, (HERMSDORF), 296, *(Unmarked)*

18-A Hermsdorf trademark.



18-B HESCHO marking.

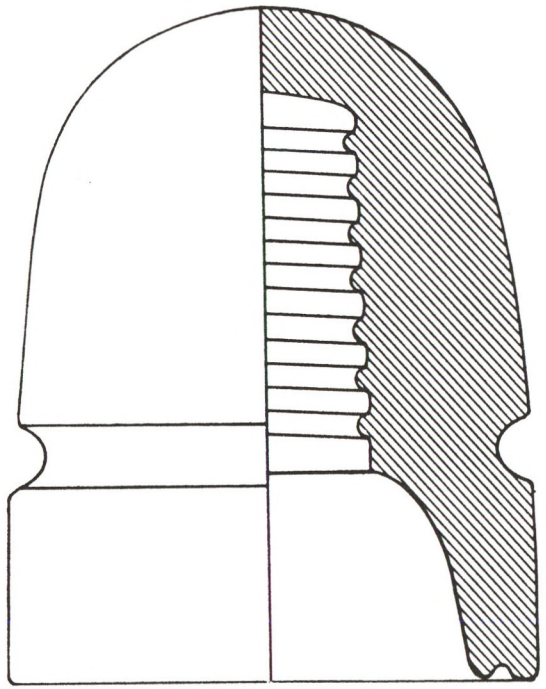
18-A (Hermsdorf trademark)
18-B HESCHO
18-C 296
18-D (unmarked)

The type 18 porcelain insulators were manufactured in Germany. As they all include the 'Gisborne grooved base', they were made to Canadian railway telegraph specifications, and were imported for that use. They are white porcelain with clear glaze, and were very well made. The base and pin-hole were not glazed, but the inside skirt was glazed. These items were made by the wet-process. The bottom of the skirt typically flares out a bit on these German products. The company that manufactured the **18-A** items was **Hermsdorf**, and their company logo can be found incised into the side of the dome. In 1922 Hermsdorf merged with H. Schomburg & Sons and formed Hermsdorf-Schomburg Insulators. The abbreviated trademark '**HESCHO**' was adopted, and can be found on the **18-B** items. The 18-C items are marked with '**296**' only, which may have been a stock number, as it is also found on the Hermsdorf and HESCHO marked items.

19-A

(Unmarked)

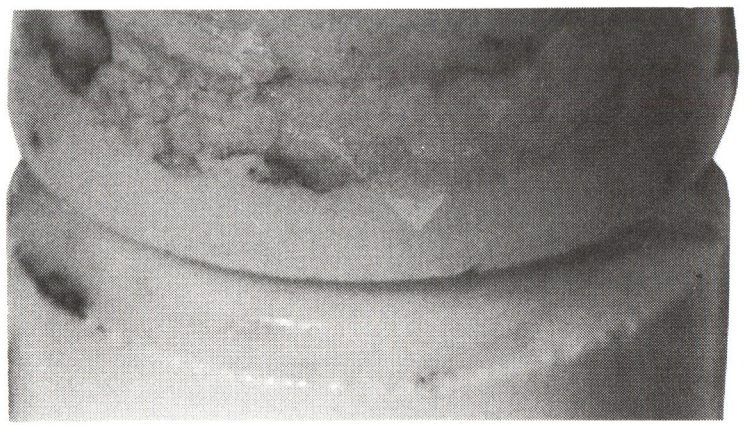
U-1132



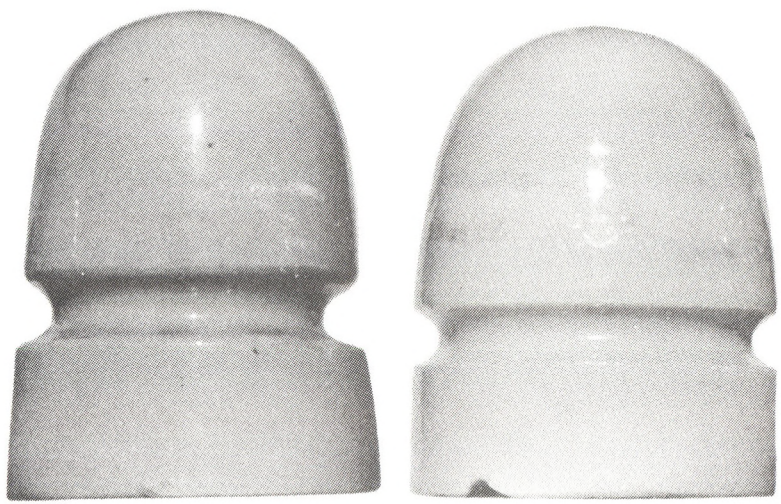
19-A

(unmarked)

The thin skirt and 'Gisborne grooved base' of the **19-A** unmarked.



Lines resembling cracks can be seen through the clear glaze. These are areas where the porcelain granules were not fully compressed during the dry-process forming.



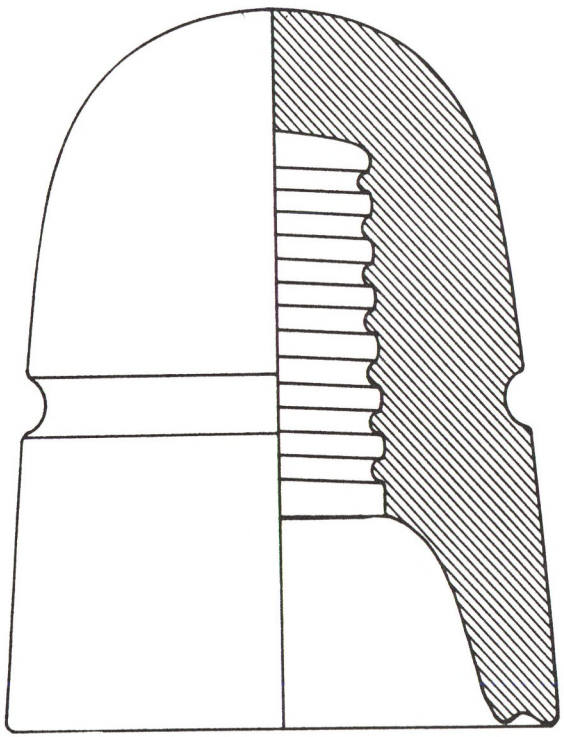
14-C unmarked wet-process and **19-A** unmarked dry-process.

The type 19-A porcelain insulators are formed by the dry-process. Small cracks can be seen through the clear glaze where the porcelain material was not fully compressed. These insulators are shorter than the Pittsburg wet-process unmarked items (type 14-C). They have very thin skirts and the 'Gisborne grooved base'. The wire groove is much closer to the base than in other unmarked examples. The 19-A style has a glazed base and inside skirt, with an unglazed pin-hole.

19-B

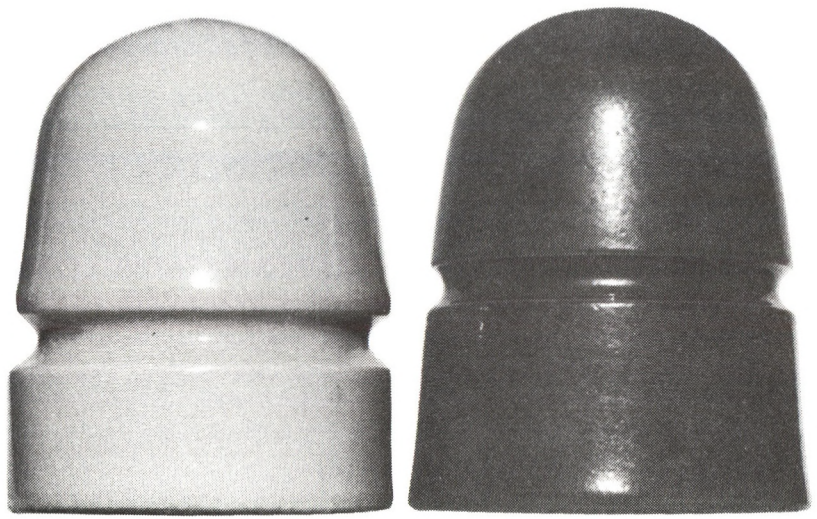
(unmarked)

U-1132A



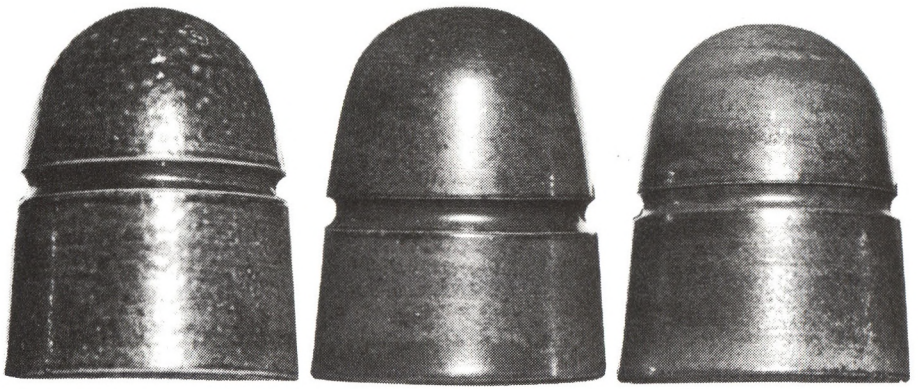
19-B

(unmarked)



The unmarked **19-A** and **19-B** insulators.

The glazed base and inside skirt
of the type **19-B** brown unmarked insulator.



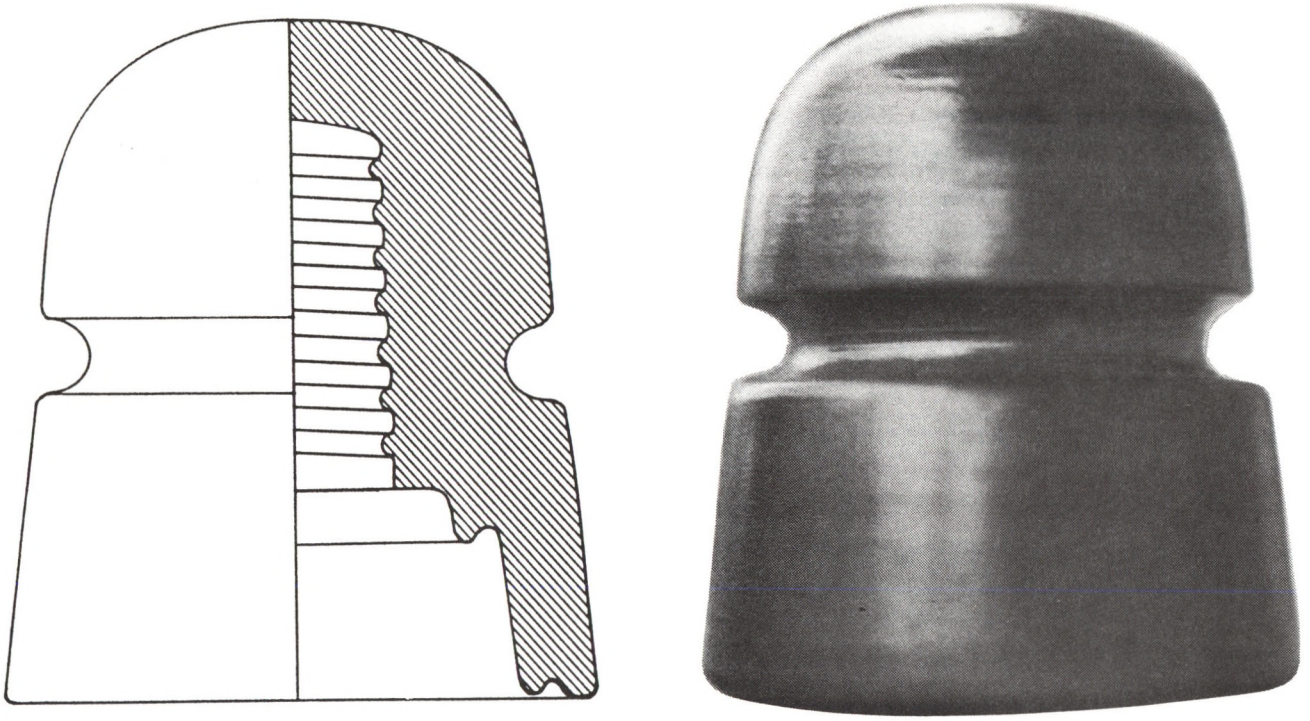
Different profiles of the **19-B** insulators.

The 19-B unmarked insulators are made by the wet-process, and have a brown glaze over a gray-coloured clay. The base and inside skirt were glazed, the pin-hole was not glazed. These items have a very small wire groove, and also have the 'Gisborne grooved base'.

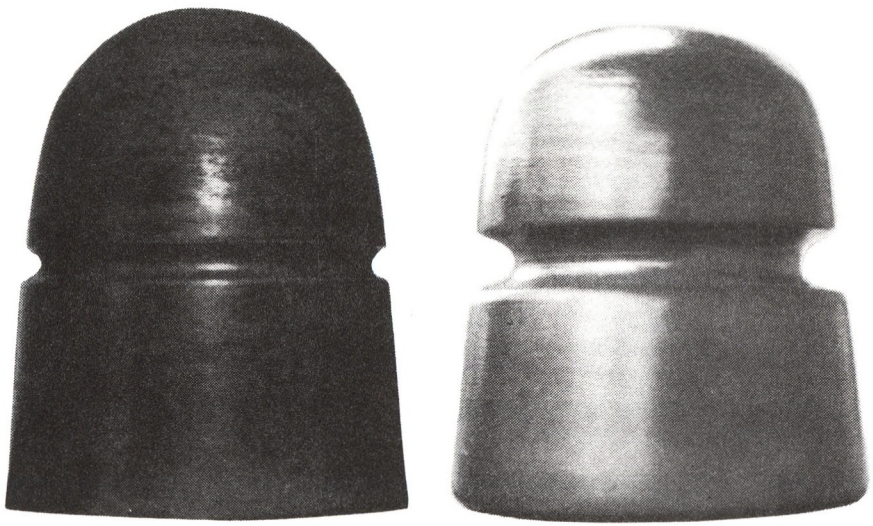
20

C.N.R.

U-1130



20
C.N.R.



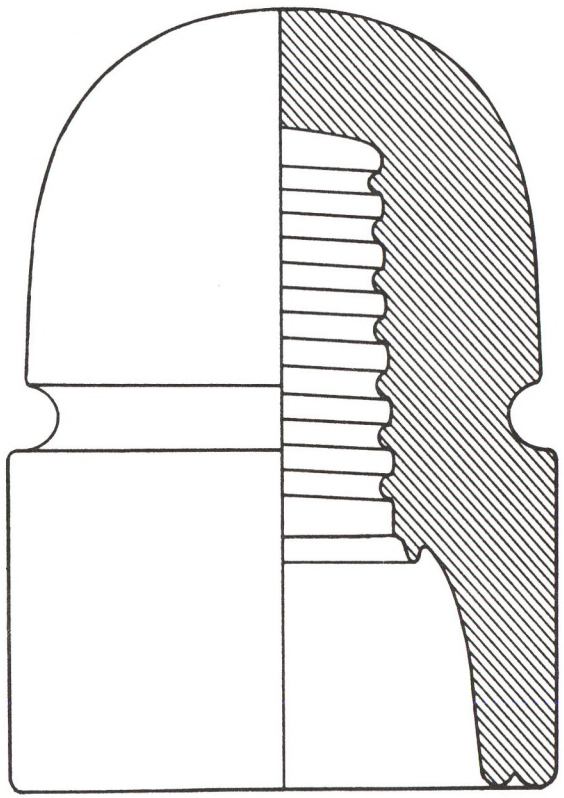
The type **19-B** and type **20** brown insulators. The type **20** is wider and has a larger wire groove.

The black under-glaze marking
on the dome top of the type **20** brown insulator.

This type 20 brown C.N.R. insulator is shorter and wider than the type 19-B brown unmarked variety. The wire groove is very deep. The base and inside skirt are glazed, and this item appears to have been made by the wet-process. The under-glaze marking is in black, and is on the dome top. This type also has a brown glaze over gray clay, and has the 'Gisborne grooved base'.

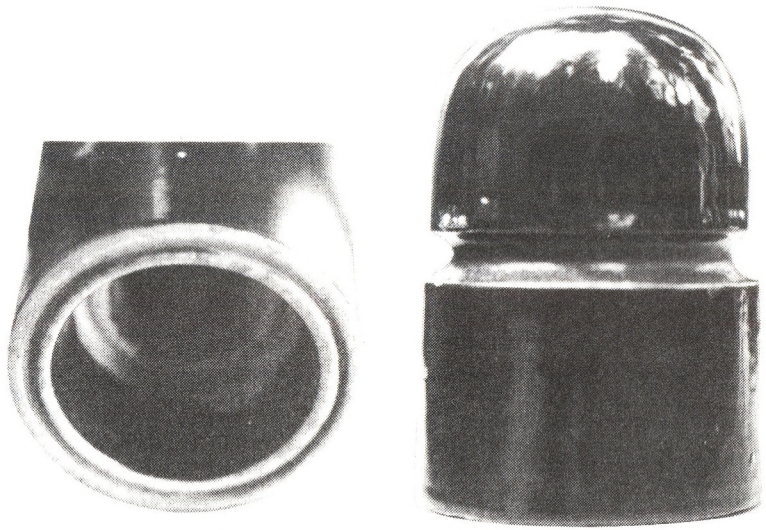
21

(Unmarked)
'Yukon Telegraph'
U-1137A

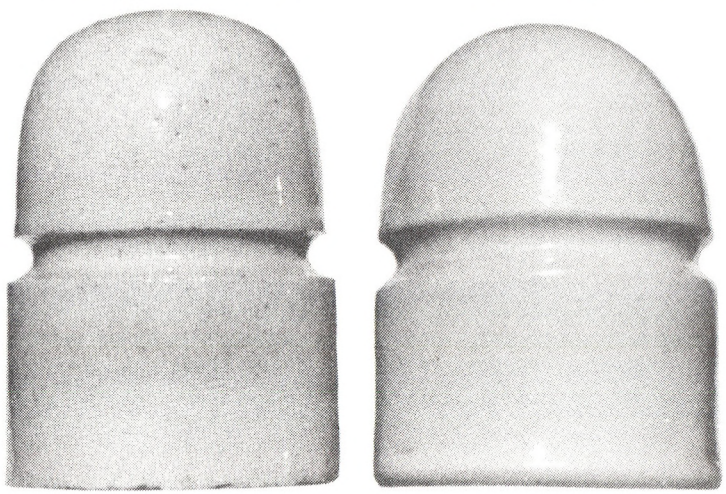


21

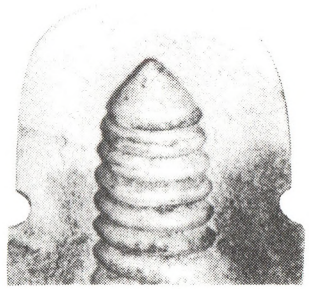
(unmarked)
'Yukon Telegraph'



The type **21-C** "Yukon" with dark brown glaze.



The type **21** 'Yukon Telegraph' style and the type **17-C** unmarked Bullers. The type **21** items are wider below the wire groove than above.



Type **21-B**: the cone-shaped point at the top of the pin-hole. (Specimen has been cut down the center.)

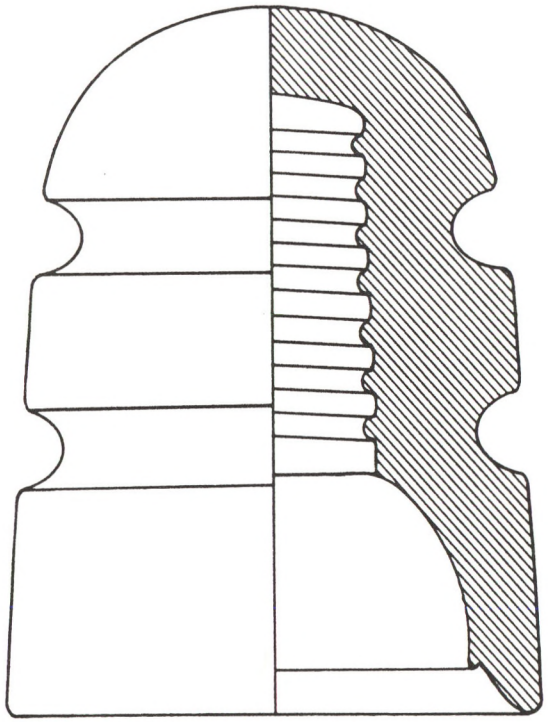
The 'Yukon Telegraph' style of insulator has straight skirt sides below the wire groove and a 'Gisborne grooved base'. Immediately above the wire groove the insulator is more narrow than below. These all appear to be made using the dry-process, as imperfections in the packing of the porcelain can be seen through the clear-glazed items. The **21-A** items are clear-glazed, have a glazed base and pin-hole, and the top of the pin-hole is flat. The **21-B** items are white glazed, have unglazed pin-holes, and a cone-shaped point at the top of the pin-hole. The **21-C** 'Yukon' style is white porcelain with a dark brown glaze.

21-A white, clear glaze, glazed flat pin-hole, wet process
21-B white glaze, unglazed pointed pin-hole, dry process
21-C brown glaze

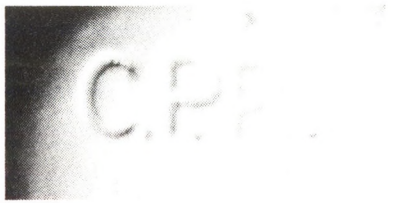
23

C.P.R.

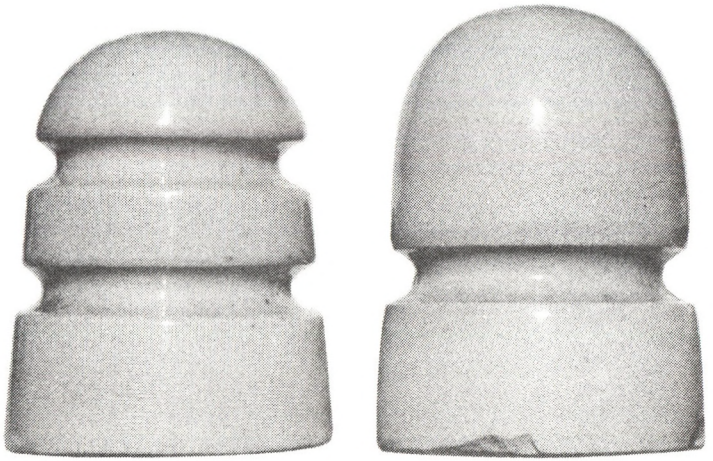
U-1196



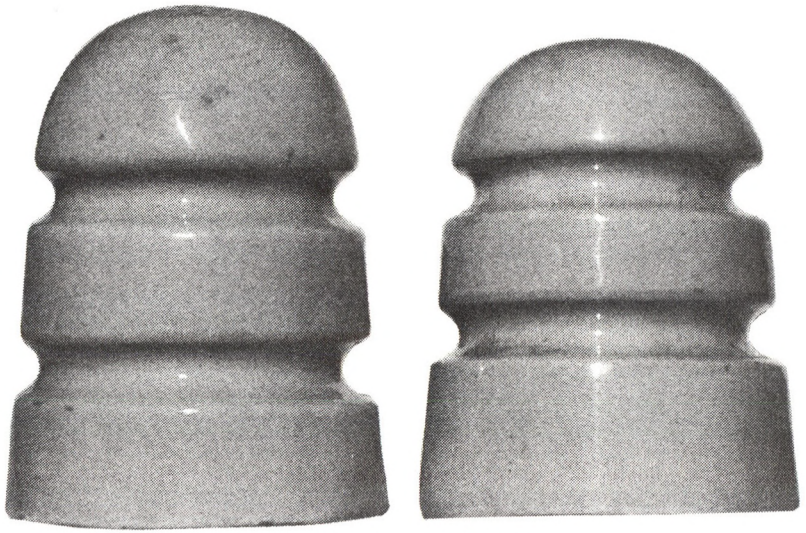
23
C.P.R.



The type 23 C.P.R. incuse marking on the dome top.



The type 23 C.P.R. and the
type 14 C.P.R. wet-process insulators.



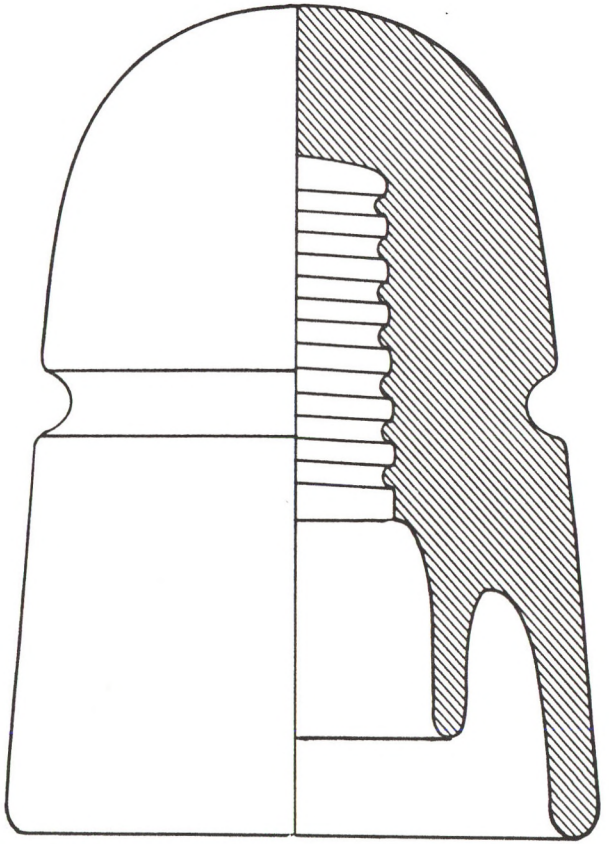
23-A and **23-B**
Different profiles of the double-groove C.P.R. insulator.

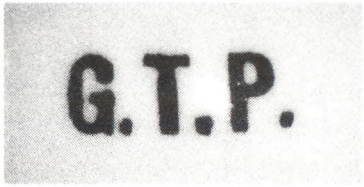
The type 23 porcelain insulators were also manufactured sometime shortly after 1908 by the Pittsburg High Voltage Insulator Company in Derry, Pennsylvania. An excavation of the dump site from the porcelain factory revealed several pieces and whole units of incuse marked C.P.R. and C.N.R. insulators. They are similar to the type 14 wet-process insulators except they have 2 wire grooves. The bases look as if they were trimmed off with a knife. The inside skirts were glazed, the bases were not. These items have unglazed pin-holes. They were clear-glazed over white porcelain. They appear with the 'pencil' type C.P.R. incuse marking on the dome top.

24

G.T.P.

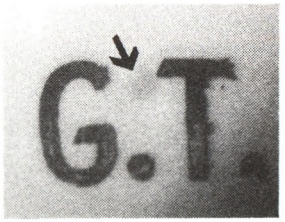
U-1140



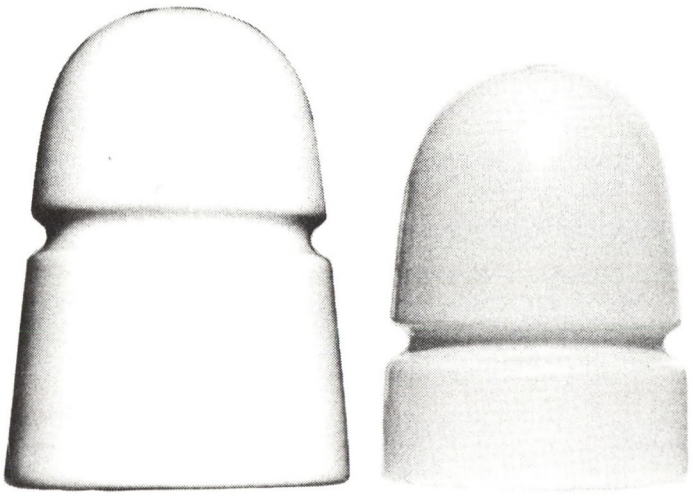


24-A G.T.P. green underglaze marking on dome top.

24-B G.T.P. green underglaze marking on dome top.
(Very large lettering)



The batch or inspection number
found on the dome top of some type **24-B** insulators.



The type **24** and type **13** European-made insulators.

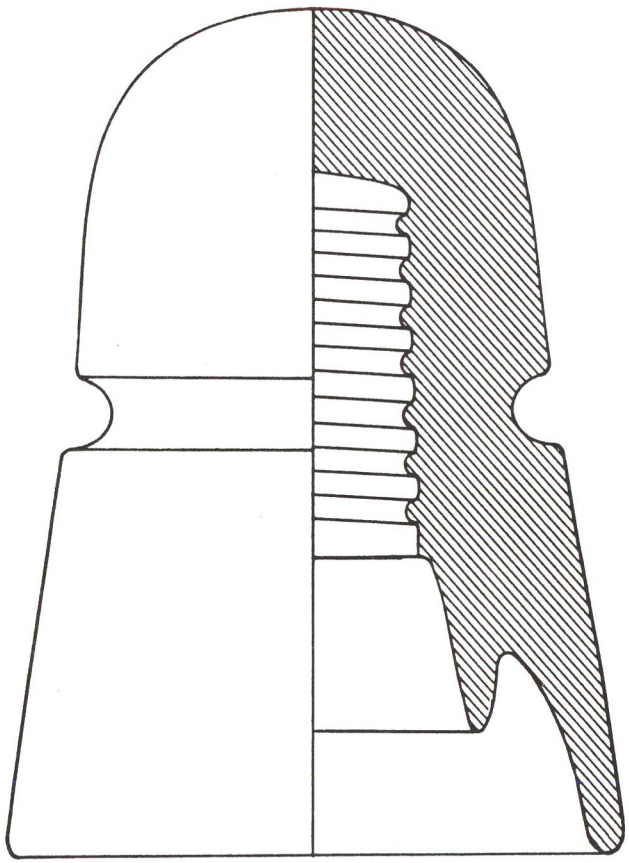
The type 24 porcelain insulators were also imported from Europe in the early 1900s. A recent excavation of a dump site from an old porcelain factory in Czechoslovakia uncovered several pieces and whole units of these green underglaze G.T.P. marked insulators. Two different green underglaze markings share this mold style. They were made to Canadian railway telegraph specifications, and imitate the glass CD-145 heavy telegraph style. They were made by the wet-process, and are of very high quality. They were clear-glazed over white porcelain. The base, inside skirt and inner skirt were also glazed. The pin-hole was not glazed.

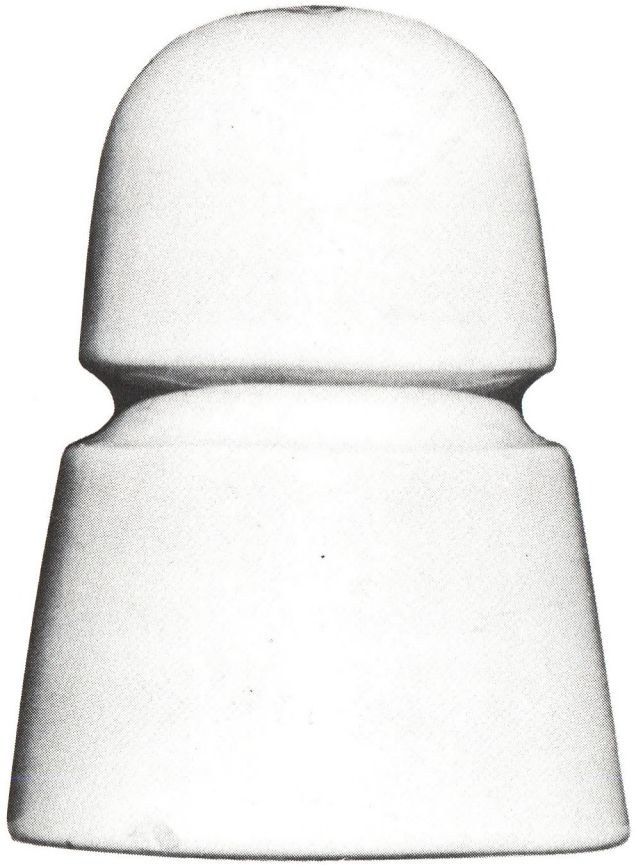
Most items were incuse stamped with a batch or inspection number on the inside skirt or dome top.

25

G.T.P.
(unmarked)

U-1141

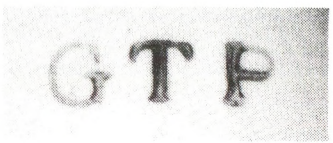




25

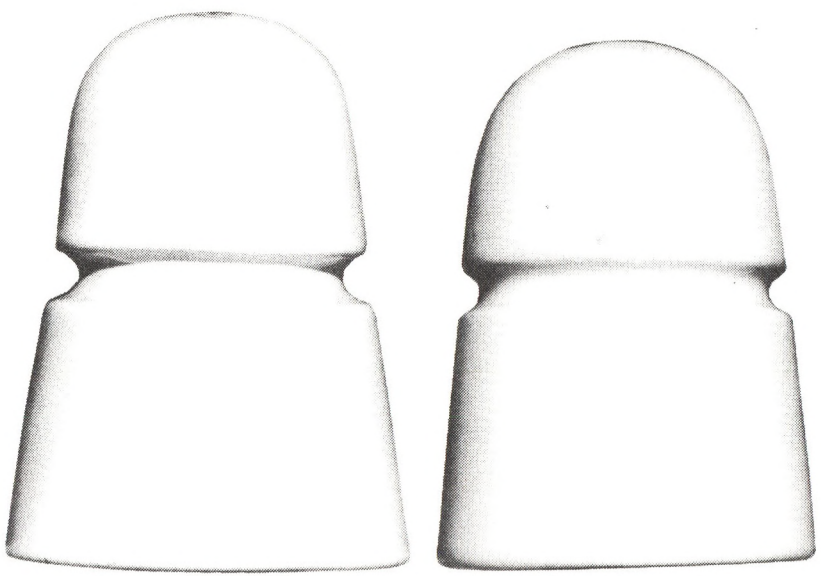
G.T.P

(unmarked)



Type-25 GTP underglaze marking on dome top.

25-A GTP **Blue** underglaze marking on dome top.
25-B GTP **Gray** underglaze marking on dome top.
25-C GTP **Black** underglaze marking on dome top.
25-D unmarked



Type-25 GTP and type-24 G.T.P. profiles.

The type 25 porcelain insulators were wet-process made and they are quite different from the type-24 European-made insulators. The inside skirt, inner skirt and base were glazed. These items have unglazed pin-holes. They were clear-glazed over white porcelain. They appear with an underglaze GTP marking in three colours, and have also been found with no marking. A few specimens are known to exist with a light blue-lavender mottled over-glaze.

Appendix 2

Numbering System Cross-Reference

Appendix 2
Numbering System Cross-Reference

This listing is provided as a method of referencing the insulators described in this book with other (previous) numbering systems. The listings include a description of each individual mold and the various numbering systems that have been used to describe them. The additional numbering systems are neccesary for referencing other literature which contain information on insulators included in this document. It can also be used as a method of locating specific items in Appendix 1.

Listing Number
This listing is included as a quick reference point for each line in the cross-section. This 'loose' numbering system is intended to accommodate additional listings of new material not already documented.

CRCI Number
This is the numbering system used throughout this book to describe each individual mold. This **CRCI** (**C**anadian **R**ailway **C**ommunications **I**nsulators) number is also the structure used for page numbering in Appendix 1.

Significant Features
This section is where mold styles or individual molds are described according to the most significant marking or mold feature.

G. Salzman Number
This is the numbering system that was expanded for use in this book. It was developed by Grant Salzman in 1980 as a method of describing the various mold styles of Canadian railway insulators.

Inv. Can. Ins. Number
This is the numbering system used to describe insulators in the report entitled, 'Inventory of Canadian Insulators', by R.J. Gauchi and Rollo McDonald in 1973. Although the report was not completed, a significant listing of some of the insulators included in this document was established.

CD or U Number
The **CD** (Consolidated Design) numbering system was developed in 1954 by N.R. Woodward as a method of describing the various glass insulator shapes. Most of the glass insulators described in this book fall into the catagory of 'CD-143', and 'CD-145', which are the typical Canadian railway telegraph styles. '**U**' numbers are from the Universal Style Chart developed in 1971 by Jack Tod as a method of describing porcelain insulator shapes.

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
10	1A1A	CANADIAN PACIFIC RY CO thin lettering, MLOD	1A	-	CD-143
20	1A2A	Unmarked	1A	-	CD-143
30	1B1A	CANADIAN PACIFIC RY CO thin lettering, thin skirt, MLOD	1B	-	CD-143
40	1B1B	CANADIAN PACIFIC RY CO, different engraving	1B	-	CD-143
50	1B2A	Unmarked 1B style tall, thin skirt MLOD	1B	-	CD-143
60	1C1A	CANADIAN PACIFIC RY CO MLOD	1C1	-	CD-143
70	1C1B	CANADIAN PACIFIC RY CO MLOD	1C1	-	CD-143
80	1C1C	CANADIAN PACIFIC RY CO shorter, thin embossing MLOD	1C1	-	CD-143
90	1C2A	CANADIAN PACIFIC RY CO backwards C variety	1C2	-	CD-143
100	1C2B	CANADIAN PACIFIC RY CO backwards C, strong embossing	1C2	-	CD-143
110	1C3A	CANADIAN.PACIFIC.R.Y. CO note periods	1C3	-	CD-143
120	1C4A	unmarked 1C style	1C4	-	CD-143
130	1C5A	unmarked whittle style (light whittling) MLOD	1C5	-	CD-143
140	1C5B	unmarked whittle style (heavy whittling) MLOD	1C5	-	CD-143
150	1D1A	CANADIAN PACIFIC RY CO (no periods) STANDARD blot out	1D1	-	CD-143
160	1D1B	CANADIAN PACIFIC RY CO (no periods) STANDARD blot out	1D1	-	CD-143
170	1D2A	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
180	1D2B	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
190	1D2C	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
200	1D2D	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
210	1D2E	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
220	1D2F	CANADIAN PACIFIC RY. CO. (note periods)	1D2	-	CD-143
230	1D3A	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
240	1D3B	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
250	1D3C	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
260	1D3D	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
270	1D3E	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
280	1D3F	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
290	1D3G	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
300	1D3H	CANADIAN. PACIFIC. RY. CO (note periods)	1D3	-	CD-143
310	1D4A	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
320	1D4B	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
330	1D4C	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
340	1D4D	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
350	1D4E	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
360	1D4F	CANADIAN PACIFIC. RY. CO. (note periods)	1D4	-	CD-143
370	1D5A	CANADIAN. PACIFIC. RY. CO. (note periods)	1D5	-	CD-143
380	1D5B	CANADIAN. PACIFIC. RY. CO. (note periods)	1D5	-	CD-143
390	1D6A	CNR STANDARD (small CNR)	1D1	1-1	CD-143
400	1D6B	CNR STANDARD (small CNR)	1D1	1-1	CD-143
410	1D6C	CNR STANDARD (small CNR)	1D1	1-1	CD-143
420	1D7A	C.N.R STANDARD (note two periods)	1D4	2-3	CD-143
430	1D7B	C.N.R STANDARD (note two periods)	1D3	-	CD-143
440	1D7C	C.N.R STANDARD (note two periods)	1D2	2-5	CD-143
450	1D7D	C.N.R STANDARD (note two periods)	1D2	2-5	CD-143
460	1D7E	C.N.R STANDARD (note two periods)	1D5	-	CD-143
470	1D8A	C.N.R. (note three periods)	1D6	3-2	CD-143
480	1D8B	C.N.R. (note three periods)	1D6	3-2	CD-143
490	1D8C	C.N.R. (note three periods)	1D6	3-2	CD-143
500	1D8D	C.N.R. (note three periods)	1D6	3-2	CD-143
510	1D8E	C.N.R. (note three periods)	1D6	3-2	CD-143
520	1D8F	C.N.R. (note three periods)	1D6	3-2	CD-143
530	1D8G	C.N.R. (note three periods)	1D6	3-1	CD-143
540	1D8H	C.N.R. (note three periods)	1D6	3-1	CD-143
550	1D8I	C.N.R. STANDARD (note three periods)	1D7	3-3, 3-7	CD-143
560	1D9A	C.P.R STANDARD (note two periods)	1D1	3-11	CD-143

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
570	1D9B	C.P.R STANDARD (note two periods)	1D2	2-9	CD-143
580	1D9C	C.P.R STANDARD (note two periods)	1D2	2-9	CD-143
590	1D9D	C.P.R. (note three periods) CAN PAC blot out	1D3	-	CD-143
600	1D9E	C.P.R. STANDARD (note three periods)	1D6	-	CD-143
610	1D9F	C.P.R. (note three periods) Blot of large CNR	1D7	3-10	CD-143
620	1D9G	C.P.R. (note three periods) horiz. dashes as blot out	1D5	-	CD-143
630	1D9H	C.P.R. (note three periods) horiz. dashes as blot out	1D4	-	CD-143
640	1D10A	G.N.R. (over small CNR) STANDARD	1D2	-	CD-143
650	1D10B	G.N.R. (over small CNR) STANDARD	1D2	-	CD-143
660	1D10C	G.N.R. STANDARD	1D1	3-14	CD-143
670	1D11A	G.P.R. (over G.N.R., over CNR) STANDARD	1D2	-	CD-143
680	1D11B	G.P.R. (over G.N.R., over CNR) STANDARD	1D1	3-12, 3-13	CD-143
690	1D12A	STANDARD	1D1	-	CD-143
700	1D12B	STANDARD	1D1	-	CD-143
710	1D12C	STANDARD	1D1	-	CD-143
720	1D12D	STANDARD	1D1	-	CD-143
730	1D12E	STANDARD	1D1	-	CD-143
740	1D12F	STANDARD (over CAN PAC blot out)	1D5	-	CD-143
750	1D12G	STANDARD (over CAN PAC blot out)	1D5	-	CD-143
760	1D12H	STANDARD (over CAN PAC blot out)	1D5	-	CD-143
770	1D12I	STANDARD blot out of large CNR	1D4	2-8	CD-143
780	1D12J	STANDARD blot out of small CNR	1D2	-	CD-143
790	1D12K	STANDARD (over large CNR blot out)	1D3	3-15, 3-16	CD-143
800	1D12L	STANDARD (over C.N.R. blot out), blot out of large CNR	1D6	-	CD-143
803	1D12M	STANDARD (over CAN PAC blot out), blot out of large CNR	1D6	-	CD-143
810	1D13A	high horizontal dashes as blot out	1D6	-	CD-143
820	1D13B	medium height horizontal dashes as blot out	1D6	-	CD-143
830	1D13C	low horizontal dashes as blot out	1D6	-	CD-143

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
840	1D13D	blot out of CANADIAN PACIFIC RY CO	-	-	CD-143
850	1D13E	blot out of large CNR	1D4	3-17, 3-18	CD-143
860	1D13F	blot out of large CNR, blot out of large CPR	1D5	-	CD-143
870	1D13G	blot out of small CNR, blot out of STANDARD	1D3	-	CD-143
880	1D13H	blot out of CANADIAN PACIFIC RY CO, blot out of STANDARD	1D2	-	CD-143
883	1D13I	(no embossing)		-	CD-143
887	1E1	unmarked, 'whittle' style, shallow whittling		-	CD-143
888	1E2	unmarked, 'whittle' style, deep whittling		-	CD-143
887	1F1	unmarked, small profile, thin skirt sides		-	CD-143
890	2A1A	CANADIAN / PACIFIC RY CO	2A1	-	CD-143
900	2A1B	CANADIAN / PACIFIC RY CO	2A1	-	CD-143
910	2A2A	CANADIAN / PACIFIC. RY. CO. (note periods)	2A4	-	CD-143
920	2A2B	CANADIAN / PACIFIC. RY. CO. (note periods)	2A4	-	CD-143
930	2A2C	CANADIAN / PACIFIC. RY. CO. (note periods)	2A4	-	CD-143
940	2A3A	CANADIAN / PACIFIC RY CO (upside down RY)	2A2	-	CD-143
950	2A3B	CANADIAN / PACIFIC RY CO (partially corrected RY)	2A3	-	CD-143
960	2A3C	CANADIAN / PACIFIC RY CO (corrected RY)	2A1	-	CD-143
970	2A4A	unmarked 2A style (can be confused with 2C unmarked)	2A5	-	CD-143
980	2B1A	CANADIAN / PACIFIC. RY. CO. (low wire groove)	2B1	-	CD-143
990	2B1B	CANADIAN / PACIFIC. RY. CO. (low wire groove)	2B1	-	CD-143
1000	2B1C	CANADIAN / PACIFIC. RY. CO. (low wire groove)	2B1	-	CD-143
1010	2B1D	CANADIAN / PACIFIC. RY. CO. (low wire groove)	2B1	-	CD-143
1020	2B2A	unmarked (low wire groove)	2B2	-	CD-143
1030	2C1	unmarked, high wire groove, pointed dome	2A5	-	CD-143
1040	3A1A	MONTREAL TELEGRAPH CO smooth base	3A1	-	CD-143
1050	3A1B	MONTREAL TELEGRAPH / . CO smooth base	3A2	-	CD-143
1060	3A1C	unmarked (smooth base)	3A3	-	CD-143
1070	3B1A	MONTREAL TELEGRAPH CO grooved base	3B1	-	CD-143

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
1080	3B1B	MONTREAL TELEGRAPH / . CO grooved base	3B2	-	CD-143
1090	3C1A	CANADIAN PACIFIC RY (raised band style)	3C1	-	CD-143
1100	3C1B	CANADIAN PACIFIC RY (raised band style)	3C1	-	CD-143
1110	3C2A	CANADIAN PACIFIC RY (raised band style)	3C2	-	CD-143
1120	3C2B	CANADIAN PACIFIC RY. (note period) (raised band style)	3C3	-	CD-143
1130	3C2C	blot out of CANADIAN PACIFIC RY (raised band style)	-	-	CD-143
1140	3C3A	CANADIAN PACIFIC RY band ends before mold lines	-	-	CD-143
1150	4A1A	C.N.R.	4-9	4	CD-143
1160	4A1B	C.N.R.	4-9	4	CD-143
1170	4A2A	C.N.R.	4-8	4	CD-143
1180	4A2B	C.N.R.	4-8	4	CD-143
1190	4A2C	C.N.R.	4-8	4	CD-143
1200	4A2D	C.N.R.	4-8	4	CD-143
1210	4A2E	C.N.R.	4-8	4	CD-143
1220	4A3A	C.N.R. very faint 'O' on rear skirt	-	-	CD-143
1230	5A1A	G.N.W. DWIGHT PATTERN	5A1	-	CD-143
1240	5A1D	DWIGHT PATTERN	5A2	-	CD-143
1250	5A1F	DWIGHT PATTERN	5A2	-	CD-143
1260	5A1G	G.N.W. DWIGHT PATTERN	5A1	-	CD-143
1270	5A2B	. DWIGHT PATTERN	5A3	-	CD-143
1280	5A3B	DWIGHT PATTERN	5A4	-	CD-143
1290	5A3D	DWIGHT PATTERN	5A4	-	CD-143
1300	5A3F	DWIGHT PATTERN	5A4	-	CD-143
1310	5B1A	G.N.W. DWIGHT PATTERN	5B1	-	CD-143
1320	5B2B	DWIGHT PATTERN backwards 2 on dome top	5B2	-	CD-143
1330	5B3B	DWIGHT PATTERN backwards 2 on dome top	5A3	-	CD-143
1340	5B4B	DWIGHT PATTERN backwards 2 on dome top	5A4	-	CD-143
1350	6A1A	GREAT NORTH WESTERN TELEGRAPH CO	6A1	-	CD-143

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
1360	6A1B	GREAT NORTH WESTERN TELEGRAPH CO.	6A2	-	CD-143
1370	6A1C	GREAT NORTH WESTERN TELEGRAPH . CO	6A3	-	CD-143
1380	6B1A	GREAT NORTH WESTERN TELEGRAPH CO grooved base	6B1	-	CD-143
1390	6C1A	G.N.W raised band style	6C1	-	CD-143
1400	6C1B	G.N.W raised band style	6C1	-	CD-143
1410	6D1A	G.N.W	6D1	-	CD-143
1420	6D1B	G.N.W	6D2	-	CD-143
1430	6D1C	G.N.W	6D3	-	CD-143
1440	6D1D	G.N.W	6D4	-	CD-143
1450	6D1E	G.N.W	6D5	-	CD-143
1460	6D1F	G.N.W	6D6	-	CD-143
1470	6D1G	G.N.W	6D7	-	CD-143
1480	7A1	horizontal Withycombe 14 above wire groove, 10 below	7A	-	CD-143
1490	7B1	horizontal Withycombe 16 above wire groove, 8 below	7B	-	CD-143
1550	7B2	horizontal Withycombe 16 above wire groove, 8 below	7B	-	CD-143
1510	7C1	horizontal Withycombe 19 above wire groove, 8 below	7C	-	CD-143
1520	7D1	horizontal Withycombe 11 above wire groove, 10 below	7D	-	CD-143
1530	7E1	vertical Withycombe 50 ridges above & below the wire groove	7E	-	CD-143
1540	7E2	vertical Withycombe 52 ridges above & below the wire groove	7E	-	CD-143
1550	7E3	vertical Withycombe 53 ridges above & below the wire groove	7E	-	CD-143
1560	7E4	vertical Withycombe 54 ridges above & below the wire groove	7E	-	CD-143
1570	7F1	vertical and horizontal Withycombe ridges	1E	-	CD-143
1580	7G1	horizontal Withycombe 11 ridges above wire groove, 16 below	-	-	CD-144
1590	8A1	unmarked	-	-	CD-143
1600	8A2	unmarked threadless	-	-	CD-743.1
1610	8B1	unmarked	-	-	CD-143
1620	8B2	unmarked	8B5	-	CD-143
1630	8B3	unmarked threadless	8B4	-	CD-743.2

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
1640	8C1	unmarked	8A2	-	CD-143
1650	8C2A	unmarked double-threaded round base	8A3	-	CD-143
1653	8C2B	unmarked double-threaded flat base	8A3	-	CD-143
1656	8C2C	unmarked double-threaded sloped-in base	8A3	-	CD-143
1660	8C3	unmarked threadless	8A1	-	CD-743.3
1670	10A1	E.D.R.	-	-	CD-145
1680	10A2	E.D.R.	-	-	CD-145
1690	10A3	E.D.R.	-	-	CD-145
1700	10A4	E.D.R.	-	-	CD-145
1710	10A5	E.D.R.	-	-	CD-145
1720	10A6	E.D.R.	-	-	CD-145
1730	10B1	G.N.W. TEL. CO.	-	-	CD-145
1740	10B2	G.N.W. TEL. CO.	-	-	CD-145
1750	10B3	G.N.W. TEL. CO.	-	-	CD-145
1760	10B4	G.N W. TEL Co.	-	-	CD-145
1770	10B5	G.N.W. TEL Co.	-	-	CD-145
1780	10C1	G.T.P.	-	-	CD-145
1790	10C2	G.T.P.	-	-	CD-145
1800	10C3	G.T.P.	-	-	CD-145
1810	10C4	G.T.P.	-	-	CD-145
1820	10C5	G.T.P.	-	-	CD-145
1830	10C6	G.T.P.	-	-	CD-145
1840	10C7	G.T.P.	-	-	CD-145
1850	10C8	G.T.P.	-	-	CD-145
1860	10D1	G.T.P. TEL. CO.	-	-	CD-145
1870	10D2	G.T.P. TEL. CO.	-	-	CD-145
1880	10D3	G.T.P. TEL. CO.	-	-	CD-145
1890	10D4	G.T.P. TEL. CO.	-	-	CD-145

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
1900	10D5	G.T.P. TEL. CO.	-	-	CD-145
1910	10D6	G.T.P. TEL. CO.	-	-	CD-145
1920	10D7	G.T.P. TEL. CO.	-	-	CD-145
1930	10D8	G.T.P. TEL. CO.	-	-	CD-145
1940	10D9	G.T.P. TEL. CO.	-	-	CD-145
1950	10D10	G.T.P. TEL. CO.	-	-	CD-145
1960	10D11	G.T.P. TEL. CO.	-	-	CD-145
1970	10E1	G.T.P. TEL Co.	-	-	CD-145
1980	10E2	G.T.P. TEL Co.	-	-	CD-145
1990	10E3	G.T.P. TEL Co.	-	-	CD-145
2000	10F1	H.B.R.	-	-	CD-145
2010	10F2	H.B.R.	-	-	CD-145
2020	10F3	H.B.R.	-	-	CD-145
2030	10F4	H.B.R.	-	-	CD-145
2040	10F5	H.B.R.	-	-	CD-145
2050	10F6	H.B.R.	-	-	CD-145
2060	10G1	T.C.R.	-	-	CD-145
2070	10G2	T.C.R.	-	-	CD-145
2080	10G3	T.C.R.	-	-	CD-145
2090	10G4	T.C.R.	-	-	CD-145
2100	10G5	T.C.R.	-	-	CD-145
2120	10G6	T.C.R.	-	-	CD-145
2130	10G7	T.C.R.	-	-	CD-145
2140	10G8	T.C.R.	-	-	CD-145
2150	10G9	T.C.R.	-	-	CD-145
2160	10G10	T.C.R.	-	-	CD-145
2170	10G11	T.C.R.	-	-	CD-145
2180	10G12	T.C.R.	-	-	CD-145

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
2190	10G13	T.C.R.	-	-	CD-145
2200	10G14	T.C.R.	-	-	CD-145
2210	10G15	T.C.R.	-	-	CD-145
2220	10G16	T.C.R.	-	-	CD-145
2230	10G17	T.C.R.	-	-	CD-145
2240	10G18	T.C.R.	-	-	CD-145
2250	10G19	T C R	-	-	CD-145
2260	10H1	G.N.W. TEL. CO. blot out	-	-	CD-145
2270	10H2	recessed band blot out	-	-	CD-145
2280	10H3	recessed band blot out re-worked, bands end before mold lines	-	-	CD-145
2290	10H4	unmarked	-	-	CD-145
2300					
2310					
2320					
2330					
2340					
2400	13A	A.E.R.	-	-	U-1131A
2410	13B	C.N.R.	-	A	U-1131A
2420	13C	C.N.R. skirt side underglaze	-	E	U-1131
2430	13D	C.P.R. small lettering	-	-	U-1131A
2440	13E	C.P.R. large lettering	-	-	U-1131
2450	13F	T. & N.O.RY.	-	-	U-1131A
2460	13G	T. & N.O.Ry. skirt side underglaze	-	-	U-1131A
3470	13H	T. & N.O.RLY. skirt side underglaze	-	-	U-1131A
2480	14A1	C.N.R. 'pencil' incuse embossing	-	-	U-1131
2490	14A2	C.N.R. 'pencil' incuse embossing brown glaze	-	-	U-1131
2500	14A3	C.N.R. small stamped incuse embossing	-	D	U-1131
2510	14A4	C.N.R. large stamped incuse embossing	-	D	U-1131

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
2520	14A5	C.N.R. small stamped over C.P.R. 'pencil' incuse embossing	-	-	U-1131
2530	14A6	C.P.R. 'pencil' incuse embossing	-	-	U-1131
2537	14A7	unmarked	-	-	U-1131
2540	14B1	C.N.R. 'pencil' incuse embossing	-	-	U-1131
2550	15A1	C N R stamped incuse embossing dry process	-	C	U-1131
2560	15A2	C N R stamped incuse embossing dry process	-	C	U-1131
2570	15B1	C P R stamped incuse embossing dry process	-	-	U-1131
2580	16A	GISBORNE PATTERN small upper-case incuse, no serifs	-	-	U-1137
2590	16B	GISBORNE . PATTERN small upper-case incuse with serifs	-	-	U-1130A
2600	16C	GISBORNE above PATTERN large upper-case incuse	-	-	U-1135
2610	16D	GISBORNE PATTERN large upper-case incuse	-	-	U-1135
2620	16E	Gisborne Pattern large upper/lower-case incuse	-	-	U-1135
2630	16F	GISBORNE PATTERN brown glaze	-	-	U-1131
2640	17A	(BULLERS trademark)	-	-	U-1135
2650	17B	BULLERS Ltd. LONDON	-	-	U-1137
2660	17C	unmarked (bullers style)	-	-	U-1135
2670	18A	(HERMSDORF trademark)	-	-	U-1138A
2680	18B	HESCHO	-	-	U-1138
2690	18C	296	-	-	U-1138
2700	18D	unmarked (Hescho style)	-	-	U-1138A
2710	19A	unmarked dry process	-	-	U-1132
2720	19B	unmarked dry process brown glaze	-	-	U-1132A
2730	20A	C.N.R. black underglaze marking on dome brown glaze	-	B	U-1130
2740	21A	unmarked dry process (Yukon Telegraph style)	-	-	U-1137A
2745	21B	unmarked wet process (Yukon Telegraph style)	-	-	U-1137A
2750	21C	unmarked (Yukon Telegraph style) brown glaze	-	-	U-1137A
2750	23A	C.P.R. 'pencil' incuse marking (two wire grooves)	-	-	U-1196
2770	23B	C.P.R. 'pencil' incuse marking (two wire grooves)	-	-	U-1196

Listing Number	CRCI Number	Significant Features	G. Salzman Number	Inv. Can. Ins. Number	CD or U Number
2780	24A	G.T.P. small green underglaze on dome (European style)	-	-	U-1140
2790	24B	G.T.P. very large green underglaze on dome (European style)	-	-	U-1140
2800	25A	G.T.P. blue underglaze marking on dome top	-	-	U-1141
2810	25B	G.T.P. gray underglaze marking on dome top	-	-	U-1141
2820	25C	G.T.P. black underglaze marking on dome top	-	-	U-1141
2830	25D	unmarked	-	-	U-1141

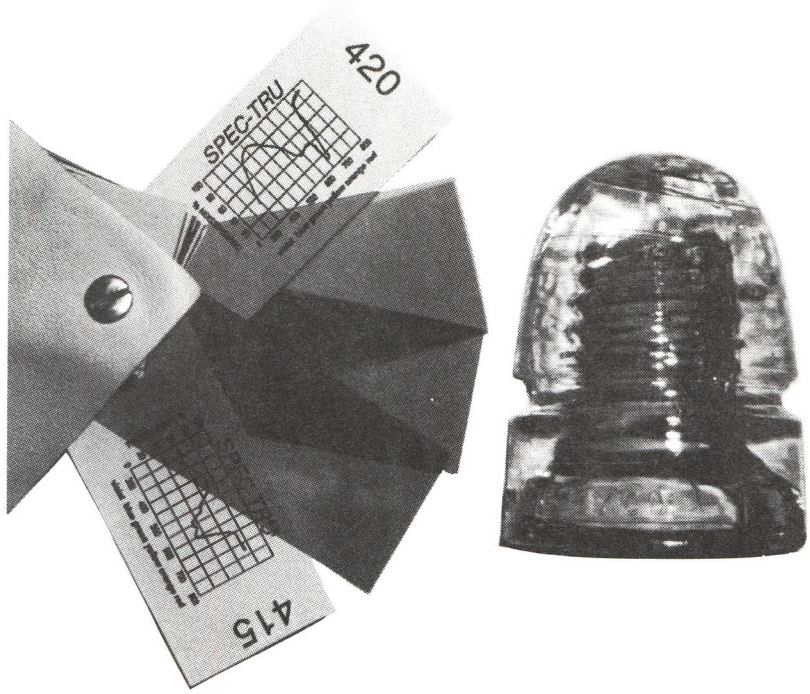
Appendix 3

Colour Reference and Colour Pages

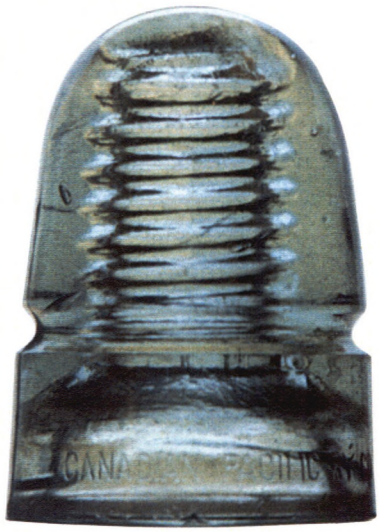
Colour Reference and Colour Photographs

Following are colour photographs of each general mold style. This listing is intended as a quick reference for identification of mold styles listed in Appendix 1, and as a visual reference of several Canadian railway insulator colours. As colour printing is not usually accurate, some of the colours in these photographs may not be exact.

The SPEC-TRU transparent glass colour reference was developed to aid in the cataloguing and description of glass colours. Due to the wide range of each colour mentioned in this study, assigning one colour sample to each colour name would not be representative of that entire colour range. As so many variations exist within each colour range for each mold style, a listing of colour samples here would contain several hundred examples and would not be complete. The colour study would also be difficult to complete without having access to all of the actual specimens to compare to the colour reference slides. A future listing of these colours will be assembled if enough collectors provide information.



Colour matching with the SPEC-TRU system.



1-A light green

1-A (slumped) purple

1-B blue

1-C swirled jade milk glass

1-D purple

1-E smoke, gray

1-F aqua

2-A dark yellow green

2-B aqua

2-C purple

3-A blue

3-B green

3-C blue aqua

4 blue with amber

5-A dark aqua

5-B light aqua

6-A blue

7-A light green

7-B light purple

7-C gray

7-D aqua

7-E dark green aqua

7-F light blue aqua

7-G light green

8A-1 dark aqua

8A-2 light cobalt blue

8B-1 dark green aqua

8B-2 light blue with blue swirls

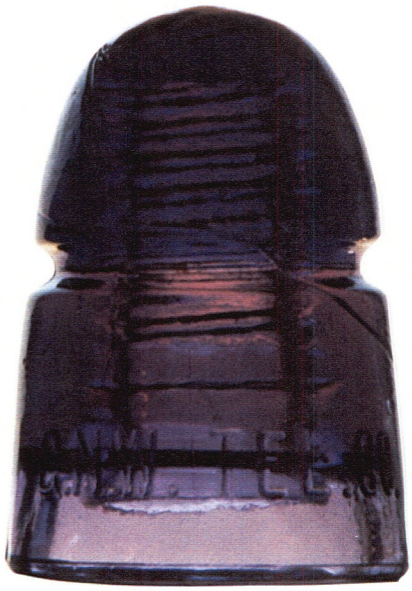
8B-3 blue

8C-1 royal purple

8C-2 light blue

8C-3 light aqua

10C-6 lt. blue with white milk



10B-3 purple

13-G white porcelain

20 brown porcelain

Appendix 4

Insulator Reference Material

Insulator Reference Material

CANADIAN RAILWAY TELEGRAPH HISTORY by Robert Burnet 1996. This book contains detailed histories of Canadian telegraph companies, and includes over 150 historic photographs, telegrams, illustrations and charts. A must for Canadian railway and telegraph enthusiasts. The companion book to Mark Lauckner's Canadian Railway Communications Insulators. Available March 1996, 250+ pages. Robert Burnet, 27 Redcar Ave., Etobicoke, ON M9B-1K2.

CONTINENTAL DASH by Rosemary Neering. A well-written historical record of the exploration, surveying, and building of the Collins' Overland Telegraph Line by Western Union in the 1860's. Includes numerous sketches and illustrations, as manuscripts and journals of several telegraph employees were referenced for the book. Highly recommended for anyone interested in telegraph history, northern exploration, BC history, and insulators. Order from: Tanners Books, 2436 Beacon Ave., Sidney, BC V8L-1X6

ELECTRICAL PORCELAIN - A HISTORY OF THE INDUSTRY IN THE UNITED STATES, by Jack Tod, 1977. This book contains the history of porcelain insulators that are not pin-types. It also contains 100 company histories, every known marking on insulator patents dating from 1880. 180 pages. Caroline Tod, PO Box 20148, Wickenburg, AZ 85358 USA

FAKE, ALTERED AND REPAIRED INSULATORS by Mike Guthrie, 1988. This booklet shows the various ways that insulators have been reproduced or manipulated, good buyer-beware information. 18 pages. Mike Guthrie, 1209 Melno, Fresno, CA 93711-1477 USA

FRED M. LOCKE, A BIOGRAPHY by Elton Gish, 1994. This book contains 100 photographs, 150 illustrations and advertisments, and detailed history on "the father of porcelain insulators". It also contains drawings and photos of each glass and porcelain Fred M. Locke insulator, with detailed information on each of his 61 patents. 343 pages. Elton Gish, PO Box 1317, Buna, TX 77612 USA

GLASS INSULATORS FROM OUTSIDE NORTH AMERICA by Marilyn Albers and N.R. Woodward, 1993, second revision. This book details all known glass insulators from outside North America. Photographs and cut-away drawings accompany each style. Manufacturers information listed by country, includes C.D. numbers, cross reference, etc. 204 pages. Marilyn Albers 14715 Oak Bend Drive, Houston, TX 77079 USA

GLASS INSULATORS FROM OUTSIDE NORTH AMERICA, PRICE GUIDE, by Marilyn Albers and N.R.Woodward, 1994. Price guide for the above mentioned book. Available soon from the above address.

HISTORY, THEORY AND PRACTICE OF THE ELECTRIC TELEGRAPH, by George Prescott, 1866. Reprinted 1972. This famous and rare book was written by the Western Union's lines superintendent and contains valuable historical information on landline telegraphy, insulators, code, etc. A must for insulator collectors interested in telegraph history. Limited supply. Hardcover, 508 pages. Artifax Books, Box 88, Maynard, MA 01754 USA

IN SEARCH OF THREADLESS - A SOURCE GUIDE FOR THREADLESS DIGGERS, by Mike Tucker, 1990. This book, with detailed maps, provides information on how and where to dig for threadless insulators. 74 pages. Mike Tucker, 508 West Cherry, Cherokee, IA 51012 USA

INSULATORS - A HISTORY AND GUIDE TO NORTH AMERICAN GLASS PINTYPE INSULATORS, by John and Carol McDougald, 1990. A two volume set, the first contains history and information about insulator companies and manufacturers. The second volume contains the CD-number photographs for each known glass insulator style, with listed colors and markings for each. A must for the serious glass insulator collector. 505 pages. Carol McDougald, PO Box 1003, St. Charles, IL 60174-1003 USA

INSULATORS - 1995 PRICE GUIDE by John and Carol McDougald, 1995. This is the price guide that accompanies the above two volume book set. 118 pages.

INSULATOR PATENTS 1880-1960. Jack Tod, 1986. Contains the patent number and date, invention name, inventor's name, and a sketch of the insulator drawing for 695 insulator patents. 130 pages. Order from: Elton Gish, PO box 1317, Buna, TX 77612 USA

MOST ABOUT GLASS INSULATORS, 4th REVISION by Marion and Evelyn Milholland, 1976. A good hardbound book with photographs of every glass insulator style known at the time, with detailed information on colors and markings. Also includes some historical information. 456 pages. C.D.Walsh, PO Box 638, Freeland, WA 98246 USA

1990 MILHOLLAND PRICE GUIDE by Paul Keating. The price guide for the above Milhollands book. 159 Pages. Paul Keating, 1705 S. 41st Street, Tacoma, WA 98404-1610 USA

MULTIPART PORCELAIN INSULATORS by Elton Gish, 1988. The book on American multipart porcelain pin-type insulators with illustrations from actual old insulator catalogs, and an abundance of drawings and photographs. This book also contains the M-number (multipart) style drawings. 132 pages. Elton Gish, PO Box 1317, Buna, TX 77612 USA

PORCELAIN INSULATORS AND HOW THEY GREW by Brent Mills, 1970. This book was prepared by the past president of LAPP, a major producer of porcelain insulators, and gives the history of the porcelain insulator industry in the USA. 288 pages. Cris Hedges, 4525 Summit St, Kansas City, MO 64111-0368 USA

PORCELAIN INSULATORS GUIDE BOOK FOR COLLECTORS, third edition, 1988, by Jack Tod. This book contains company histories and information on every marking of porcelain insulators from the USA. It also contains the U-number (uni-part) chart for all pin-type American porcelain insulators. 160 pages. Order from: Elton Gish, PO box 1317, Buna, TX 77612 USA

RAILROAD TELEGRAPHER'S HANDBOOK, 1991. Illustrations and information on landline telegraph equipment, ad reproductions, etc. 60 pages. Artifax Books, Box 88, Maynard, MA 01754 USA

RAILWAY AND OTHER RARE INSULATORS by W. Keith Neal, 1987. A revision for "Searching For Railway Telegraph Insulators" containing over 30 more photos, and additional information on British insulators. 32 pages, N.R. Woodward, PO Box 171, Houston, TX 77001 USA

SEARCHING FOR RAILWAY TELEGRAPH INSULATORS by W. Keith Neal, 1982. This book is about insulator collecting in Britain. 135 illustrations and photos (spanning 60 years) of British insulators and lines. Includes the story of the author's collecting hobby, and additional information. 92 pages. N.R. Woodward, PO Box 171, Houston, TX 77001

SPEC-TRU COLOR REFERENCE FOR TRANSPARENT GLASS by Mark Lauckner, 1991. This flip-book of 110 color slides can be mixed to match any glass color, described with a number. Also includes lighting correction filters and instructions. Mark Lauckner, Mayne Island, BC VON-2JO Canada

THE GLASS INSULATOR - A COMPREHENSIVE REFERENCE by Gary Cranfill 1969. Numerous photos and illustrations, includes insulator company history. 144 pages. Gary Cranfill, 6353 Buckeye Lane, Granite Bay, CA 95661-9681 USA

THE GLASS INSULATOR IN AMERICA, 1988 REPORT by N.R.Woodward. This book contains drawings of all CD-numbers (consolidated design) for glass insulators, as well as a cross reference with manufacturers markings and the history of threaded glass insulator manufacture in North America. 99 pages. N.R. Woodward, PO Box 171, Houston,TX 77001-0171 USA

VALUE GUIDE FOR UNI-PART AND MULTI-PART PORCELAIN INSULATORS, 1995, by Elton Gish. The first comprehensive listing of all known US uni-part and multi-part porcelain insulators shows values, manufacturer, marking, and color for each of the 3375 uni-part and 826 multi-part porcelain insulators, plus rarity and distinctive details on unusual insulators! Additional listings are sorted by color, and manufacturer, plus a U-# chart supplement containing 86 new styles since Jack Tod's 3rd edition in 1986. 142 pages. Order from: Elton Gish, PO box 1317, Buna, TX 77612 USA

WORLDWIDE PORCELAIN INSULATORS by Marilyn Albers and Jack Tod, 1982. Porcelain pin-types from outside USA, includes a U-number style chart and manufacturers information. 8 1/2 X 11, 84 pages. Marilyn Albers, 14715 Oak Bend Drive, Houston, TX 77079-6418 USA\

WORLDWIDE PORCELAIN INSULATORS - 1986 SUPPLEMENT by Marilyn Albers and Jack Tod 1986. An update for the 1982 book with 160 new drawings and more information on manufacturers. 8 1/2 X 11, 42 pages.

PERIODICALS

CANADIAN INSULATOR COLLECTOR Magazine Research, history, news, advertising, information and network for collectors of Canadian railroad, telephone and telegraph insulators. Bi-monthly. Canadian Insulator Collector, Mayne Island, BC Canada VON-2JO

CROWN JEWELS OF THE WIRE insulator magazine. Features articles, research department, porcelain insulator column, foreign insulator column, letters, show reports, advertising, and an annual directory of subscribers and National Insulator Association members. Monthly. Carol McDougald PO Box 1003, St Charles, IL 60174 USA

RAINBOWRIDERS' TRADING POST - FOR INSULATOR COLLECTORS. This magazine is devoted to insulator trading, and does not accept advertising which offers them for sale. It includes letters, articles, show calendars, information, etc. Monthly. PO Box 1423, Port Hueneme, CA 93044 USA