columns of all three tables represent the same values while the values in the *horizontal* columns of the three tables differ as follows:

Number of Lamp-feet per Small Space	Tables..		
	55 Volt.	75 Volt.	110 Volt.
Inside Horizontal Column.....	500	1000	2000
Middle Horizontal Column.....	125	250	500
Outside Horizontal Column	31 25	62 5	125

The tables are very simple, and will become familiar to the user after a short practical experience.

The 55 volt table may be used for lamps of a voltage between 50 and 60 volts, the 75 volt table for lamps of a voltage between 70 and 80 volts, and the 110 volt table for lamps of a voltage between 100 and 115 volts. The results will be accurate enough for all practical purposes.

In calculating the tables, lamps requiring 55 watts were assumed. The following table gives the electrical data of such lamps:

16 CANDLE-POWER LAMP REQUIRING 55 WATTS.

Electromotive Force in Volts.	Current in Amperes.	Resistance hot in Ohms.
110	.50	220
75	.7338	102.207
55	1.00	55

Under Rule VII it was shown that Rule VI could be simplified by calculating the constants for each kind of lamp and each percentage of loss. In the following table are given the constants for 55 watt lamps at different percentages of loss in the conductors.

TABLE OF CONSTANTS.

	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	12½	15%
55 Volt Lamp.	38.8	19.2	12.7	9.4	7.5	6.1	5.2	4.5	4.0	3.6	2.7	2.2
75 Volt Lamp.	20.9	10.3	6.8	5.1	4.0	3.3	2.8	2.4	2.1	1.9	1.5	1.2
110 Volt Lamp.	9.7	4.8	3.2	2.4	1.86	1.5	1.3	1.1	.99	.88	.66	.56

The wiring formula, Rule VI, can now be written $d^2 = N \times D \times K$, or, *the size of wire in circular mils = lamp-feet multiplied by constant.* The constant K is found from the formula:

$$K = \frac{21.58}{r \text{ hot}} \times \frac{100 - \%}{\%}$$

From the foregoing it will be very easy to find the constant for any lamp and any percentage of loss, and calculate the size of wire without the aid of any tables whatever.

THE BOILER EXPLOSION AT QUEBEC.

THE boiler explosion at the Riverside Worsted Factory, which happened on the 12th February, was the most disastrous which ever occurred in Canada, both as regards loss of life and destruction of property. Our readers will no doubt be interested in some of the facts regarding this very serious occurrence. The engineer who had charge of the steam plant was among the killed, and if carelessness on his part was the real cause, he has paid his share of the penalty. The second engineer stated that he had nothing to do with the boilers and was employed only in the engine room.

There were three steam boilers of the type so commonly used in Canada, and known as horizontal tubular boilers. These were 6 feet in diameter and 16 feet long, with about 84 tubes in each, the tubes being 4 inches in diameter. Each boiler had a dome 30 inches diameter and 30 inches high, and rivetted to the boiler shell by a double rivetted joint. The boiler plates were said to be of good boiler plate iron, three-eighths of an inch thick, and the logitudinal seams double rivetted. The boilers were built in brickwork with Jarvis furnace setting. Each boiler had a safety valve, loaded by lever and weight and intended to open at about 80 pounds pressure. There were also shut-off valves by which the outlet to the steam pipe might be shut, and each boiler had a steam gauge and glass water gauge and try cocks.

The mill had not been running for some days, it having been closed to permit of some changes and repairs to the engine. On the morning of the day of the explosion, steam was got up intending to start the mill, but on trying the engine it was found there was something wrong and it would not go, and while a number of men were engaged on the engine, the explosion took place. The middle boiler exploded, being literally blown to pieces, the other two were thrown out of their seats, the one to the right and the other to the left, and were each broken into several pieces. The dome of the exploded boiler was torn off, leaving the flange rivetted to the plate of the shell. The body of the dome was thrown to a considerable distance. Such were the facts connected with the disaster, and it is important to notice that steam was up in all the boilers, and that none had been used except what was required for the heating apparatus.

A coroner's inquest was held, and after a very lengthy enquiry and the examination of many witnesses and of the remains of the exploded boiler, the following verdict was returned. "That the said Arthur Tweedell and others were killed by the explosion of the centre boiler of the Quebec Worsted Company's mill, the said explosion being due to an over-pressure of steam in the said boiler, caused by the stop valve being then closed. Furthermore, that the jurors recommend the appointment, as in other places, of a competent city and district boiler inspector, one who has both theoretical and practical knowledge, and who has had experience in the manufacturing of both boilers and engines and all the connections thereof."

The verdict says the boiler exploded because of over-pressure "caused by the stop valve being then closed." But what of the safety valve? It was there for the very purpose of preventing over-pressure, either when the stop valve was closed or open.

The jury *said* nothing about the safety valve, but they saw it. And when they saw it, they saw that before the explosion took place it had ceased to be a safety valve, and its condition really made the explosion possible. The probability is that the steam gauge had been frozen while the mill was closed, as there had been some very cold weather during these days. These boilers were under the inspection of the Quebec Provincial Inspector who was examined at the inquest. His qualifications may be guessed at by the wording of the jury's recommendation. He had no experience or special training to qualify him for the position, but after working in a boiler shop for a few weeks when a boy, had worked at a variety of businesses, such as carpenter, butcher, ship chandler, traveller for sale of boots and shoes, jewellry, &c. How these various occupations qualified him to inspect boilers may be judged from the fact that he did not discover the condition of the safety valve and other fittings on this exploded boiler.

If ever there is to be cumpulsory inspection of steam boilers, let this example be a warning. The government that will attempt to make boiler inspectors part of the political machine, and appoint as inspectors, men who are expert politicians, deserves to have its own safety valve rusted up and a good fire kept going till it gets blown so high that the scattered fragments will be forever lost. Had there been competent inspection and ordinary prudence, this terrible disaster would not have occurred.

To all engineers and firemen the lesson is: *make sure* for yourselves that whenever you put a fire under a boiler there is plenty of water in it, and way for the steam to get out. This boiler exploded simply because there was no outlet for the steam, and the probability is that there was a pressure of not less than 300 pounds in it when it exploded. It would hold about eight tons of water, and the explosion would not be much less than that of a ton of gunpowder, so that there need not be much surprise at the serious destruction of property.

The President of the Bell Telephone Company, of Montreal, recently inquired of the Secretary of the Treasury at Washington whether the end of the telephone cable to be passed through the tunnel connecting Sarnia with Port Huron, Mich., will be permitted to enter free of duty. Assistant Secretary Spaulding has informed him that so much of said cable as may be brought within the limits of the United States will be subject to duty under exlsting laws, the Department having no authority to waive the same.

An exchange points to the fact that the possibility of electricity being used as the motive power for railroads in the feature is assuming an interesting condition. Stations may be located some forty or fifty miles apart, which will be run by large engines, and from recent tests it is found that an electric motor will mount a grade of more than fifty per cent. Not only on railroads, but on ocean steamers will a new era be inaugurated when electricity is introduced. The advantages being a saving of expense, higher rate of speed, and the danger of accidents decreased.