COMMENTS ON REMARKS MADE BY COL. R. E. B. CROMPTON BEFORE THE INTERNATIONAL ELECTRICAL CONGRESS AT ST. LOUIS.

BY JOHN W. HOWELL.

The following quotation is from the remarks made by Col. R. E. B. Crompton in his discussion of the papers read by Mr. Torchio and Mr. Dow, at the International Electrical Congress at St. Louis, last September.

"In England our variety of distribution systems is not so great as we find here. We started with three-wire 200- or 220-volt systems, distributing at 110 volts. We have everywhere practically doubled this voltage. All our largest cities in England, including London with its 6 000 000 inhabitants, after very careful consideration, practically adopted what you have called the double-voltage system. This doubling the voltage was not adopted without a struggle. For a long time the lamp manufacturers opposed it, and told the consumers, probably with some reason, that they would be at a disadvantage, as lamps of the double voltage could not be made so efficient as lamps at the single voltage; but we showed that this could be remedied by refinements in lamp manufacture, so that now it would be very difficult for the consumer to find that he was at any practical disadvantage on account of inferior efficiency of the double-voltage lamps."

"The result is that the majority of our consumers take their supply at pressures varying from 200 volts in London up to 250 volts in Glasgow. We therefore consider this question settled and therefore completely disagree with all the arguments on this point in both Mr. Torchio's and Mr. Dow's papers."

These remarks indicate that either the English makes of 220-volt lamps are very much better than those made or known in this country, or that English makes of 110-volt lamps are very much inferior to those made here, or that the considerations and

conditions, other than the difference in quality of the two types of lamps, which effect the choice of one system or the other are different in the two countries.

As a lamp engineer seeking all available information on lamps, I recently secured samples of the best known makes of 220-volt lamps on the English market, thinking that the very extensive

use of such lamps there had led to the development of a better lamp than that produced in this country. I here present data on tests which I have made on these lamps, and also

similar data on tests made on American-made lamps.

I obtained 25 of each of these five makes of lamps, Sunbeam, Stearn, Royal Ediswan, Robertson, and Cryselco, my letter

to our English representative asking for samples of the best-known lamps on the English market. All these lamps were labeled 220-volts, 16 c-p. All of them were photometred at 220 volts; the results are shown in the target diagrams. These

diagrams show a very great lack of uniformity in the individual lamps of each make, and a tendency to low candle-power and high watts per candle. The average of each group is indicated on the diagram by a small circle.

These averages are as follows:

		Candles.	Watts per candle
Make C.....		15.5	4.00
" D.....		13.5	4.65
" B.....		14.3	4.33
" A.....		14.5	4.37
" E.....		11.4	5.20

These are supposed to be 16 candles, 4 watts per candle.

For comparison with these I reproduce here a similar diagram made on Edison lamps—220 volts—4 watts per candle which I

take from a paper read by Mr. F. W. C. Bailey before the National Electric Light Association, May 1902. Mr. Bailey obtained these lamps on the open market through a supply house. These lamps average 16.2 candles, 3.83 watts per candle, and

show very much greater uniformity of candle-power than the English lamps.

The rectangles shown in these diagrams indicate the limits within which these lamps must come to meet the requirements of the American market.

To determine the quality of these lamps, 15 of each lot were set up for life-test. In order to make this comparison fair all were set up at the same watts per candle, all were set up at 3.1 watts per candle as the lamps were received in May and it

was necessary to set them up above their rated efficiency in order to finish the test in time for this meeting.

For comparison with these I set up at the same time and under the same conditions lamps of our own make and rated

the same as the English lamps. These lamps were taken at random from our own stock, no selection being made.

The results of these tests are shown in the diagrams showing loss of candle-power and time of burning. The lamps in each lot were quite uniform. The average results are as follows:

Make C.....	104 hours to 80 per cent.				
" B.....	88	"	"	"	"
" E.....	65	"	"	"	"
" D.....	82	"	"	"	"
" A.....	72	"	"	"	"
" Edison.....	156	"	"	"	"

These results indicate that the Edison lamps made in this country are 50% better than the best make of English lamps of this type, and nearly twice as good as the average of the other makes tested.

These samples may not fairly represent the average quality of the different makes of lamps but the uniformity of the lamps in each lot indicates regularity in manufacture. The total result certainly indicates that the American-made 220-volt lamps are not inferior to those on the English market.

Regarding 110-volt lamps which are the standard for central-stations in this country. The Association of Edison Illuminating Companies purchases several millions of these lamps each year; all of these are inspected and samples are regularly tested for life.

These inspections and tests are made by the Electrical Testing Laboratories in New York. I have obtained from them the target diagram of Edison 3.1-watt, 110-volt lamps. They give it as a fair sample of these lamps at the present time.

The curve showing loss of candle-power with time for this class of lamps represents the average result obtained on 5 488 lamps tested for life during the year ending May 1, 1904. This shows 512 hours life to 80 per cent. The average efficiency of these lamps was 3.14 watts per candle, correcting this to 3.10 watts per candle gives the useful life to 80 per cent. to be 480 hours, which is over three times the useful life of the American 220-volt lamps and over five times the useful life of the average of the English 220-volt lamps tested.

At any efficiency other than 3.1 watts per candle, the relative values of these various lamps would be the same, so it may be

said that at any efficiency 110-volt lamps are at least three times as long lived to 80 per cent. as 220-volt lamps.

It is our experience, based on many tests, that 110-volt lamps of 3.1 watts per candle and 220-volt lamps of 3.8 watts per candle have equally useful lives.

It is the custom in England for the consumer to purchase his lamps where he pleases, the electricity supply companies furnishing current only. Under these conditions using lamps of the same efficiency and considering them dead when they have

fallen to 80% candle-power, the customer using 220-volt lamps would have to buy three times as many lamps as one using 110-volt lamps, and each lamp would cost more money.

Or if lamps of equal life were used each 220-volt, 16-candle lamp would consume 11 watts more than a 110-volt, 16-candle lamp. Assuming that both lamps last 500 hours, each 220-volt, 16-candle lamp would consume 5 500 watt-hours or 5.5 kw-hr. more than each 110-volt lamp; and with current costing 10 cents per kw-hr. each 220-volt lamp of 16 candle-power would during its life consume 55 cents' worth of current more than each 110-volt lamp.

Colonel Crompton says: "it would be very difficult for the consumer to find that he was at any practical disadvantage on account of inferior efficiency of the double-voltage lamps."

This may be true under English conditions, but in this country most large lamp consumers buy lamps on close specifications and make tests to see that the specifications are fulfilled. It is also a common custom in this country for consumers to buy samples of different lamps on the market and determine by test which makes are best. This forces lamp makers to mark their lamps very accurately for volts and candle-power, for any package may be tested in competition with lamps of other makers.

If these customs prevailed in England it would be impossible to sell such badly-rated lamps as those which are the subject of the tests given in this paper.

These tests indicate a general lack of information on the part of the English consumers on the subject of quality and performance of lamps. It is not surprising that people who will continue to use lamps so poorly rated for volts and candle-power as these are, would not appreciate the difference between 220-volt and 110-volt lamps but; English engineers should know the difference between good and bad lamps and between 220- and 110-volt lamps.