

NOTES FROM THE RESEARCH LABORATORY,
GENERAL ELECTRIC COMPANY.*

PHOTOMETRIC METHODS IN CONNECTION WITH MAGIC-
LANTERN AND MOVING-PICTURE OUTFITS AND A
SIMPLE METHOD OF STUDYING THE INTRINSIC BRIL-
LIANCY OF PROJECTION SOURCES.†

By J. A. Orange.

THIS article gives the practical details of the apparatus re-
quired and manipulation for the purposes indicated in the title.

THE HIGH-FREQUENCY SPECTRUM OF TUNGSTEN.

By Albert W. Hull and Marion Rice.‡

THE spectrum of tungsten at voltages up to 150,000 has been studied and photographs are given showing the first, second, and third order reflections of the $K\alpha$ and $K\beta$ lines. The position of the K lines in relation to the general radiation at various voltages has been studied by means of the ionization chamber and is shown on curves of intensity for seven voltages between 40,000 and 103,000. The lines first appear at 80,000 volts, increasing in intensity with rising voltage. Kossel's quantum relations between the frequencies of K and L lines hold true for the tungsten lines. All the lines, including tungsten, can be expressed by the empirical formulæ:

$$\begin{aligned}\gamma_{\alpha} &= 1.64 \times 10^{15} N^{2.10} \text{ for the } \alpha \text{ lines,} \\ \gamma_{\beta} &= 1.56 \times 10^{15} N^{2.15} \text{ for the } \beta \text{ lines,}\end{aligned}$$

where γ is the frequency and N the atomic number.

The shortest wave-length observed was 0.08 A. U. The proportionality between frequency and voltage observed by Duane and Hunt holds accurately up to 100,000 volts and less accurate measurements indicate its constancy up to 150,000 volts.

* Communicated by the Director.

† *General Electric Review*, 19 404-5, May, 1916.

‡ *Proc. Nat'l Academy of Sciences*, 2 265-70, May 15, 1916.