Discussion of Paper by C. A. B. Halvorson

Mr. Dennington: Mr. Halvorson brought out some very interesting points in his paper, not only in regard to some of the difficulties that have been met and overcome in the construction of the lamp, and also in the application of this lamp for projection purposes, but there was one point on which it seemed to me he might have gone a little further. Mr. Halvorson showed the adjusting mechanism of the mirror, but it would seem that the mirror might be fixed in position, just as the condenser, leaving only the light sources movable.

The use of an incandescent light source has advantages which the general public has been very slow to recognize fully. The fact that this light source when once placed in position remains fixed, is one of the features that has not been fully appreciated, because all of the mechanism which has been on the market has had adjustments.

Now, there probably has been in the past a very good reason for these adjustments, because they were absolutely necessary with any light source which moved its position from time to time as the electrodes burned away. With an incandescent source which remains fixed, that is not absolutely necessary, and a permanent adjustment of the light source is possible and advisable.

I have in a number of instances mentioned this possibility before this Society, and it would seem that we are getting at least one very simple application of the plan, and I think it can be carried further. There are other applications which are outside of the regular projection field, in which the scheme can be adopted—searchlights, floodlights, may be mentioned, merely as examples, where the light source could be preadjusted, placed in the reflector or other optical system in the correct position, and that will enable closer regulation to be made than has been possible where the adjustment is left up to the individual.

I want to ask Mr. Halvorson a question with reference to the inner and outer filament of the coil of the lamp. He mentioned the inner coil as being hotter than the outer. Does that make any difference, or does it cause a non-uniform screen distribution of light, by having that effect, a hotter inner coil than outer?

Mr. Halvorson: I don't think it would affect it much one way or another.

Mr. Kunzman: You haven't made any experiments on that, have you?

Mr. Halvorson: It would be less than the regular increase. The range in temperature, the ratio, maximum to minimum, would be very much lower than it would be in the case of any other luminant. However, there is a difference there—in that particular case, the inside coils are under tension, whereas the outside coils are supported, and there is a double action in there. The outside coils were closing up, the inside ones dropping down.

Mr. Halvorson: Mr. Dennington spoke about mounting mirrors in a non-adjustable manner. That has been tried. We machined up

the facings of the lamp houses, i. e., we started in to build a "precision" lamp house. If the job is really to be done right we should start in with the lamp, locate the filament with reference to the axis of the base, etc., and make the filament itself with less than 2/1000 of an inch variation from the draftsman's design. To make such a lamp would be very expensive and the cost of such a lamp would be all out of proportion to the cost of a lamp made and turned out cheaply by multiple process machines as at present. In addition, the mirrors themselves vary. The outside radius of curvature will remain the same, but the distance from the opening of the mirror to the center of curvature may vary. When speaking of mirrors, I wish to say that the Bausch & Lomb people have done everything possible to make Mazda lamp projection a success. When we undertook the development of the proposition, the life of a mirror was 30 hours or less. Today the life of a mirror is unknown, due in part to improved ventilation and to the new type of silvered back developed by Bausch & Lomb which is a wonderful development.

There is 8-10% loss on the cooling plates that can be corrected for by filing out the cooling plate aperture so as to accommodate the wide angle of light used with the present prismatic condensing system. In addition to light being lost here, there is actually a shadow cast on the screen by the edges. Another thing, Figure 10 shows a difference of 100% in the No. 1 lens from 4"—6" E.F. and 75% in the No. 2 lens from 5½"—8½" E.F. Why can't the lens manufacturers straighten these curves out so that there will be no difference?

The shutter obstructs 50% of the light. Faster intermittents will help this (we have transmitted 85% of the light experimentally without flicker or wear to the film) and also there is the continuous moving film such as Mr. Jenkins has developed. Then again a change in screen design may also help to increase its brilliancy.

There is an installation in this city, in a medium-sized theater. It was put in three weeks ago in anticipation of this meeting. I thought that possibly you, gentlemen, would like to see a typical installation representative of this development. It is at Crandall's Knickerbocker, at 18th and Columbia Road, in an 1,800 seat house.

A member: What is the throw?

Mr. Halvorson: 108 feet, with a 16 foot picture.

What has been so far accomplished represents only the first step in the development of the incandescent lamp for this class of work. Hundreds of these equipments have been tried out quietly as commercial experiments in order to get information on the lamps, etc. In New England alone, there are over 250 equipments operating in theaters of all sizes and conditions, many of them have been installed for over a year. We are still a long way from the melting point of tungsten. By raising the current to 33-35 amperes the illumination on the screen can be increased 60-125%. Of course, this would mean a short life lamp, but it is not ridiculous to talk about a 25-hour life or even a two-hour lamp. It is also possible to obtain 50% more light with a special condenser system. It has been done experimentally and we will do it some time commercially.