

However, I thank you very much for the kind reception you have given me.

On motion, the meeting adjourned at 10.45 P. M.

---

[COMMUNICATED AFTER ADJOURNMENT BY EDWARD P. THOMPSON.]

Having followed the invention underlying Prof. Matthews' new photometer, through the United States and foreign Patent Offices, and having been unable to attend the meeting, I take pleasure in adding my commendation of the valuable experimental and practical work obtained by the author of the paper. It may not be amiss to add something about the actual novelty of the device considered as an invention. This may best be accomplished by quoting one of the claims granted by the United States Patent Office as an award for his ingenuity.

"In an apparatus for measuring candle power, the combination with the support for the light to be tested, of a photometer screen, and mirrors so fixed as to illuminate said screen proportionally to the mean spherical candle power of said light, said mirrors remaining stationary during the operation of measuring the light."

This is one of the twenty-three claims granted by the Patent Office. It serves to show that Prof. Matthews has originated a new type of photometer, and the members will no doubt greatly appreciate his services in providing an instrument which will so readily save time and tedious calculation.

I have also examined complete drawings of Mr. Burnett's photometer for measuring illumination in terms of the number of luxes instead of in terms of distance. The device as practically carried out is exceedingly simple, and without movable parts. There is nothing to get out of order.

---

### CRITICISM ON THE MEAN SPHERICAL CANDLE POWER AS A STANDARD FOR ILLUMINATION.

[COMMUNICATED AFTER DISCUSSION BY ALEXANDER J. WURTS.]

The mean spherical candle power is unquestionably the present accepted standard of light, but in reviewing a subject of this kind, it often is instructive to consider whether we may not be somewhat biased by a practice, rule or standard which has ceased to be either useful or practical. The question arises as to whether we wish to continue this standard as our guide. Does the so-called standard meet with our approval? Does the mean spherical candle power, as a standard, measure that which we desire to have measured? In the opinion of the writer, it fails to do so and it would seem that something which more nearly meets our present needs should be devised.

In years gone by, when the incandescent lamp was practically the only electric lamp in commercial use, and later, even after the arc lamp had been introduced, the photometric determination

of candle power served a purpose and gave a nominal rating to these lamps, but the great difference in candle power between the arc and incandescent was such that comparison between them on a basis of mean spherical candle power was of small consequence. With the advent, however, of new illuminants, the question of fair comparison becomes at once a matter of considerable practical importance.

In the laboratory, the photometer has proved itself a valuable guide in determining the relative life and efficiency of illuminants under varying conditions. If there were only one kind of illuminant to be considered, then units differing slightly in candle power could be easily and satisfactorily compared with this instrument, either by direct measurement or by the mean spherical candle power method; but with illuminants differing widely in candle power, quality and distribution of light, neither the direct measurement on the photometer nor the mean spherical candle measurement offer a fair basis of comparison, because two lights having the same mean spherical candle power might differ widely in quality and distribution of light or effective illuminating power. For example, let us consider two lights exactly the same in every respect except that one throws all its light upward, whereas the other throws it all downward. Both have the same mean spherical candle power, but obviously not the same effective illuminating power for a given purpose. Take for further illustration the various well-known electric lights—the incandescent, the arc, the Nernst, the Hewitt and the Bremer. These all differ widely in both quality and effective illuminating powers for a given set of conditions, and as above shown, cannot be consistently compared by the standard of mean spherical candle power.

It follows logically and as a matter of fact that a user of light never, it may be said, inquires about the mean spherical candle power of an illuminant; the only use he makes of a photometer is to test with it some guarantee of candle power which may have been furnished with his lamps. The practical user in negotiating for this or that illuminant is more interested in the effective illuminating power of the lamp in question than he is in the mean spherical candle power, and by effective illumination is meant that amount of light which is reflected to the eye from the objects it is desired to see. The total light flux is of no consequence to the dry goods man or his customers, to the hotel keeper or his guests, except in as far as upward or horizontal rays may be reflected from ceiling and walls. Interest centers rather in (1) the quality of the light; (2) the effective illuminating power; and (3) cost of maintaining the illumination. If this last statement be correct, may not the comparison of various illuminants as to the three points involved be more practically and satisfactorily determined in some other way than by the mean spherical candle power method; that is, by a method which does not place on an equal footing a sphere of soft white

light and a search light, assuming that both have the same mean spherical candle power.

Having thus criticised the mean spherical candle power method of comparing lights, your attention is called to a rather old photometer or means for comparing different illuminants which seems to be worthy of more attention than it has yet received and one which also seems to be capable of considerable development. The photometer in mind provides a means for comparing the effective illuminating powers of various illuminants and involves every characteristic, advantage and disadvantage which may be found in any particular class of illuminants. This method has been used from time to time in a crude way, by placing different kinds of illuminants in the same room and noting the illumination, but could not this idea be carried out on a more practical and elaborate scale by providing two rooms exactly alike in every respect, that is, in dimensions, color and furniture, and then by locating standardized units of light, such as 16 c.p. incandescent lamps, in one room, comparing the effective illuminating power of these lamps as a standard with the effective illuminating power of any other lamp or lamps arranged in the other room in any manner whatsoever which will produce the best results—namely, the most effective illumination with the particular kind of lamp. For example, suppose it be desired to illuminate a dry goods store, the chief points to be considered being the illumination of goods on the counters and on the shelves back of the counters, also boxes and their labels above the shelves to a height of eight feet above the floor. Question: For a given expenditure of energy, can this illumination be obtained more effectively with this or with that lamp. In making such comparison of effective illumination, it would seem proper not to make any restrictions whatever as to the position or distribution of the units. Both the lamps to be used as standard and the lamps to be compared with the standard should be located and distributed to the best possible advantage with reference to effective illumination.

With the two-room photometer above described, it would be a simple matter for the observer to place himself in a position commanding a good view of the two rooms for purposes of comparison. The illumination of the standard room might be easily varied by using a considerable number of small units and the wattmeter readings would of course give the relative efficiencies for equal effective illuminating power. Comparisons of this kind have been made by the writer, not, however, in such an elaborate manner as above described, but if the various illuminants now in the field could be thus authoritatively compared with reference to effective illuminating power and the results tabulated and given to the public, users of artificial light would have before them a reasonable and practicable means of determining the best illuminant for a given set of conditions.