tween reflectors we will consider these lamps in the same position but fitted with a form of prismatic glass reflector, having a diffusive coating of enamel. We will also assume that the tip halves of the bulbs are frosted in order to cut down the intrinsic brilliancy of the light sources within visible range. The uniform illumination curve of this unit shows somewhat better distribution below the horizontal and the following intensities at the several stations:

A—0.35 foot-candles.
B—1.2 " "
C—0.34 " "
D—0.5 " "
E—0.75 " "
F—1.6 " "
G—1.7 " "
H—0.8 " "

In this case the minimum illumination in the reading plane would be 0.5 foot-candles, which is not much greater than with the flat opal reflector. With the half frosted lamps, however, and the use of diffusing reflectors the apparent illumination is very much increased, in fact the increased degree of comfort experienced with lights fitted as in this example would easily increase the visual effectiveness of the illumination twenty per cent. as compared with the preceding arrangement.

It is obvious that the lighting as shown will not go very far towards illuminating the innermost parts of the shelves. Neither is this necessary to be accomplished in any marked degree, but an improvement in this direction is of considerable benefit. We will therefore adopt an arrangement of lights as illustrated in Fig. 2, using small goose necks placed 8 ft. apart along the top of the shelving. We will suppose each of these to be equipped with an 8 C.P. clear bulb lamp and a prismatic glass reflector, having a card-board shade to prevent the accumulation of dust on the outside of the prisms. The reflector used in this case is one producing a considerable depth of curve and the lamps are pointed at an angle of 35 degrees from the vertical. We will now consider that for the lighting of each row of shelving only the lamps on the opposite side of the aisle are to be used. Proceeding similarly as above we have the following results:—

A—0.3 foot-candles.
B—1.15 " "
C—0.5 " "
D—0.7 " "
E—0.75 " "
F—0.7 " "
G—0.52 " "
H—0.45 " "

It will be observed that this illumination is much more uniform and that the average illumination on one side of the aisle is nearly as high as was obtained with the use of 16 C.P. lamps located as before described. It therefore seems probable that an arrangement of lights above the shelving, each row controlled by a switch at the end of the shelves on the opposite side of the aisle (i.e., the shelves to be lighted by the lamps controlled), would under the conditions of actual use result in much greater economy of current as well as provide better illumination.

The uniformity secured under this arrangement will be better understood on calculating the effect of neighboring lamps. Considering the section in Fig. 2 to be anywhere throughout the length of the aisle the following intensities are obtained without any allowance for diffuse reflection:—

	Maximum.	Minimum.
A	05.	0.4
B	1.45	0.9
C	0.68	0.4
D	0.9	0.55
E	0.93	0.53
F	0.9	0.4
G	0.66	0.5
H	0.57	0.5

About the same average illumination at the points taken for calculation would be produced with 16 C.P. lamps unshaded and spaced every 8 ft. along the aisle, but with much less uniformity and far less visual effectiveness. With the arrangement now arrived at it is not necessary to use frosted bulbs, as the lights are always above and behind the person working at any row of shelves. The illumination of the interior of the shelves is also improved.

What we have done so far, however, is only to improve the illumination. The cost of this must be considered.

We will assume that the switches will be placed conveniently so that one row of 8 C.P. lamps will be turned on the same length of time as would the row of 16 C.P. lamps in the first arrangement above described. The cost of equipment per the last description is $9.25 more than according to the first method. The consumption of power in the last case will be 160 watts as against 280 watts in the first case. With current at 8c. per K.W.-hour the saving effected during the life of the first installation of bulbs will be $19.20 plus $1.25 for renewals, when using only one row of lamps, or a total saving of $20.45. Deducting the extra first cost, we have a net saving of $11.20 during the life of the first installation of lamps. A liberal allowance for maintenance would not reduce this saving below $10.00. In the building under consideration there are some 3,600 ft. in length of aisle, with shelving on both sides, so that corresponding economy throughout the building means a net saving of $830.00 before the first set of lamps is discarded. Figuring the cost for renewals and 20 per cent. for breakage of reflectors and with the same liberal allowance for maintenance, the saving while the second lot of bulbs is in use will amount to $1,286.00. This does not take into consideration the lighting of offices and shipping department.

In this warehouse there are some thirty different arrangements of shelving and in some cases the requirements were such that some modification of the arrangement shown in Fig 2 was necessary. Throughout, however, the same principles were applied that have been illustrated and in many cases a more marked improvement in the illumination has been effected than under the particular conditions chosen for an illustration of average requirements. Of course it is essential that the actual voltage be tested and that good lamps of the proper duty be purchased for the available voltage in order that the full benefits of such calculations as above described may be realized.