

RATE SCHEDULES AND DIVIDENDS.

By "ECONOMY."

MOST electrical journals devote a considerable amount of space to papers by well known authorities, dealing principally with the financial side of electric lighting and power service, pointing out how expenses can be diminished and incomes increased. The authors seem to be mostly connected with very large plants, and their proposals and expedients, while theoretically sound, apply only to such large enterprises. Instead of any further trying to cut down the cost of production per k.w. in the generating plant, or of insisting upon a still higher efficiency in all parts of the producing or transmitting system, the electrical fraternity is turning its attention to the establishment of a proper basis for the formulation of rate schedules, having been forced to the conclusion that a uniform rate for all classes of customers, whether by meter or month, is not only unscientific, but actually results in selling electricity to some for less than the cost of production, while other consumers who should be encouraged pay for more than they should. Although the conditions governing the operation of large and small plants are so dissimilar that the adoption of a certain policy may be beneficial for the one, while suicidal for the other, still there are always certain broad, general principles upon which every successful business must be conducted, and which, underlying as they do the business of electric lighting, will apply to some extent to all sizes of plants.

In order that a plant may be a profitable investment, the operating expenses must be as low as possible; the business must be pushed for all it is worth, and losses must be reduced to a minimum. The various expedients for effecting economies in the power house, condensers, heaters, etc., are beyond the scope of this article, and it is assumed that everything has been done in this direction that skill and experience can effect. If without increasing the investment, the business and therefore the income can be increased, the result will evidently be in the nature of a larger dividend. If the total load is not as great as the capacity of the power house, then a vigorous canvass is the first means that would occur to everyone. But in the medium-sized provincial town, which is the condition more particularly investigated in this article, the possible business with the average rates charged has distinctly a clear limit. There is no day business such as is found in cities—in cellars, vaults, restaurants, etc. The business done is principally with stores, hotels, a few private houses, and the churches. A considerable proportion of the population of every medium and small town lives in quite small houses, and is usually considered useless for electric lighting purposes; but if they could be brought in by any means, it might be good business, even if a slightly increased investment were required. Using 10 c.p. lamps generally has a good effect in this direction. But in many cases, a general all-round reduction of rates by a small percentage is counterbalanced by an increase of business, which is of itself advantageous in improving the load and therefore raising the efficiency of operation. A considerable class of possible consumers would no doubt be attracted by proposals based on the shutting off of their lights at 10 o'clock. A 10 c.p. lamp on a 10 o'clock circuit would probably pay the power house a satisfactory sum, while offering great attractions to persons who are not willing to pay a larger rent for a lamp on the chance of wanting it to burn all night—or at odd times during the night. It is a very simple matter to calculate what it actually costs the central station to produce the energy for such a lamp, taking account of all fixed and variable expenses; the possible renting price will be found within the means of very small householders. The probabilities are that in such a case a separate circuit would be required, but only a secondary circuit, and the same transformers might by suitable arrangements be made to cover the increased service.

For stores, alternating long-burning arcs may be used when the space is free from hangings. Where, however, the full capacity of the power house is already rented, the only methods available for increasing business are either to reduce the number of less profitable lamps and cater only to the most profitable business, or to use lamps of the highest efficiency obtainable. Unfortunately, the latter course is possible only at the expense of remodelling the distributing system—as a general rule. For the higher the efficiency of the lamp, the greater necessity for very close regulation of pressure applied. In order to obtain this very close regulation, the entire secondary wiring, including the house work, must be planned with very small allowance for drop, and transformers used of a low "drop" percentage. Whether, under the existing conditions of investment, etc., it is really worth the while of any particular plant to rearrange its distributing system to suit the requirements of more economical lamps, in order to enlarge its income, is a matter for careful consideration. The factors entering into the discussion are: A double benefit results from the use of higher efficiency lamps, first, the reduction of the power required per lamp, and, next, the increased number of lamps that can be supplied by the same power. In a 1,000 light plant the coal saving would probably amount in the course of 12 months to \$30 by using 3 watt and $3\frac{1}{2}$ watt lamps. This \$30 saving would pay 6% on \$500, which would go a long way towards rendering the distributing system fit for such high efficiency lamps. Or if the lines were not remodelled, then the \$30 could be devoted to the replacing of such lamps as suffered by the variations in pressure. But the main advantage would be in the fact that more lamps could be supplied by the same machinery. In this sized plants the rental might be increased by at least \$50, which would pay a month's wages to the engineer. It is very cheap to sneer at such small savings, but nowadays, with competition from gas and acetylene, and rates being forced down by town councils, dividends must be looked for much more closely and carefully than formerly, and the engineer who does not care to save \$50 deserves to lose his place. An engineer who is not

above saving \$50 in one direction, is very likely to have his wits so sharpened, that he will see another \$50 somewhere else.

A thoughtful consideration of the rate schedules of many medium sized plants will reveal many anomalies, and if done in a systematized way by a considerable proportion of the more progressive managers, will probably prepare the way for a more scientific and equitable method, which, after the usual grumbling attending all changes, will give more general satisfaction to both consumers and producers. It is usual to give the same meter rate to all consumers, no matter how large or small their requirements, or what the class of business, whether residential or commercial. Here is an actual case: A prominent politician in a certain town took forty 16 c.p. lamps, in billiard room, large drawing room and other public rooms seldom used, and elsewhere where their use was continuous. His family being small, he really occupied only part of the house, and the whole family always spent about half the year away from home. Paying by meter, of course there was no income from this installation half the year, when the house was shut up. During the other six months the occasions when the house was fully lighted were, as can be expected, few, and the actual consumption of energy was for at least five days a week about what an average 10-light installation should reasonably expect to pay for. This means that the consumer required four per cent. of the total capacity of the plant to be held at his disposal during the entire twelve months, while he paid for the privilege just half as much as another consumer who required only one per cent. of the total capacity. In other words, this extraordinary condition existed that the latter consumer's rate for current was eight times as much as the former's. There are many plants where all wiring is done by the company without charge to the consumer. In such a case, it will be evident that a consumer whose maximum demand bears a large ratio to his average may actually be a source of loss to the power house.

In the above instance, the power house was entitled to expect an amount of business sufficient to pay four per cent. of the entire fixed expenses of the plant, for interest, depreciation, wages, maintenance, insurance, taxes, and also the cost of the coal and water consumed in supplying the amount of energy actually used. The actual payment was, over and above the cost of coal and water consumed, just one-half of one per cent. of all the fixed expenses. The total annual fixed expenses of such a plant that could be fairly charged against the incandescent business amounted to about \$2,000. The above installation should have paid four per cent., or \$80; it really paid \$10. In a limited sized plant, where the demand for light—or the possible demand—is a little beyond the capacity, such an installation is relatively an actual loss. It is an exaggerated case, although an actual one, but every plant that sells by meter will have some similar experience. Many a house is wired for fifteen lights, while the average consumption is reasonable for four. The maximum number burning at any time will be possibly eight or nine. Here, while the consumer should (on the above basis) pay one-eighth of the fixed expenses, he actually pays only one-sixteenth, or half as much as he should. It is true that the difference amounts only to \$4, but he is paying the power house for energy \$4 less than it costs to produce that energy. This is one good way to avoid being troubled with having dividends. The remedy is simple, and suggests itself at once. A minimum charge should be made to a consumer, proportionate to the size of his installation to cover his proportion of all the fixed expenses of the plant, and then the energy consumed as registered by the meter should be charged in addition. In this way only will each and every consumer pay a fair proportion of the expenses. The way of determining this minimum charge is to establish what are the fixed expenses of the plant, taking into consideration always interest on first cost, depreciation at a percentage, insurance, taxes, and dividing the total by the number of lamps which can be expected. Then each lamp must return at least this calculated minimum, in order that it may pay its way. If it does not, then it simply represents bad business.

It may be objected that to charge this minimum will cause the loss of many customers, and that such method is unnecessary because the results of the whole year's operation are a dividend; that the good and the bad must be taken together; and the policy of management must be judged in the bulk, and not piecemeal. This point is well taken where the business is not sufficient to fill the power-house up to its full capacity; but in many plants it is beyond the present capacity, but hardly enough to justify a considerable increase. In such a case the substitution of a consumer whose average consumption is nearer to his maximum for one whose installation is largely in excess of his usual requirements, is evidently a clear gain to the plant. If instead of the one 60 light customer with his six months absence and average of 10 lights, five customers could be obtained for eight lights each with an average requirement of four all the year, the result to the plant would be twenty paying lights for twelve months, instead of only ten paying lights for six months. It is very probable that, if a minimum rate be charged for water supply, the business of some consumers would drop off altogether, because it would take some time for people to understand that if they require a certain proportion of the power house to be reserved for their use (and thus render it unavailable for other business) they should pay for the privilege whether they use it or not.

Still, it is plain that a thoroughly successful business cannot be built up on erroneous principles, and it does not seem equitable that the small consumers—who really are the best paying ones—should be discriminated against so very heavily as in the above example.

The imposition of a minimum yearly or monthly sum—in proportion to the number of lights installed—to cover all the fixed expenses of the power house, should be offset by taking out that factor in calculating the cost per kilowatt hour. The resultant meter charge per k.w. hr. would be found to be so greatly reduced as to attract many new consumers, to the great advantage of the business.