pated that many users of power, who are at present working under uneconomical conditions, will find it advantageous to avail themselves of this supply, which is expected to be available at a price something like one penny per horse power per hour. It seems probable that the operation of such a scheme would only be commercially practicable in districts where the local authority does not control electric supply, because when the local authority has to be dealt with the price obtainable from that authority would not probably exceed the rate at which they could themselves produce the power, without any allowance for profit. As the local authority could, and doubtless would, avail itself of the most efficient means of power production, the only item to set off as a possible profit to the supply company would be the railway carriage in the coal. Unless under very exceptional circumstances, it is hardly conceivable that this margin would be sufficient to cover the very heavy capital cost of the generating plant. On the other hand, undoubtedly there is an enormous field for the electric motor among small users of power who can obtain the electric current at a moderate rate from supply companies or local authorities. This class of consumers form an important group by themselves.

I propose in this paper to confine attention to those factories where the total power required is upwards of 50 horse power, and where the power is produced on the consumer's premises. To what extent and in what manner in such factories can electric power transmission be advantageously used? The conditions as to requirement of the work to be done, and the present methods of doing it, are so various that it is difficult to enter upon a useful discussion on general lines.

Two typical groups may be chosen for discussion:

Group I.—Factories where the power is delivered from one main engine through gearing, belting, or ropes to line shafting, which is in turn belted or geared to machinery closely grouped round the source of power. This includes most factories where the machinery runs at a constant speed on a fairly steady load, as in spinning and weaving factories.

Group II.—Where the nature of the work is such that the power must or ought to be delivered direct from the prime mover at the point where it is applied to the work. This includes factories where the machines to be driven are widely divergent in character, are widely spaced, and run at different and varying loads and speeds, as in paper mills, printfields, chemical works, steel works, foundries, shipyards, and many engineering establishments where work of a varying character has to be accomplished. This group affords by far the most promising field for the electrical engineer.

In the first group advantage can, to a large extent, without the use of electrical transmission, be taken of the direct economies to be gained by the centralization of power production, and the electrical engineer must, as a rule, base his argument in favor of the adoption of electrical transmission rather on such points as saving of space and cost of construction, absence of noise, and additional convenience, than on any claim for direct economy in coal consumption. Of course there are very many cases where an enormous saving could be accomplished, even in such factories, by the introduction of a good modern electric equipment, but, generally speaking, an equivalent saving could be gained by more direct means. There are, however, important advantages gained where electric motors can be applied directly to the working of machinery of production. No matter how well engineered the arrangements may be in the first instance, all systems of transmission by rope or belt are subject to increasing and varying slip; and, apart altogether from the loss of power arising from this cause, this has the very serious result of reduction in speed of the machinery of production. Thus, a slip in the belt or rope driving a machine or group of machines reduces the output in direct proportion to that slip, while the total expense of production remains the same. It is quite certain that this is the frequent source of loss even in the best managed factories. The electric motor can be arranged to run at constant speed if the electric pressure be maintained constant, and this can be and is easily regulated, observed, and recorded automatically if necessary, and the speed may be maintained constant within any desired range. While, as a general rule, in such factories it appears that the case for electricity is not strong enough to warrant any very great capital expenditure, with a view to direct economy in fuel, it by no means follows that there may not be exceptions to the rule. Such exceptions would probably be found in factories where the nature of the machinery and transmission is such that, after the best that gearing and straps can do has been done, there remains a loss between the prime mover and the producing machinery of more than 25 per cent., or in factories where the machinery is used in an intermittent manner, and where a saving could be made by stopping the shafting along with the machines. There are very many such cases.

Looking at the matter from the standpoint of comparing the best that can be done by shafting with the best that can be done with electric transmission, it may be taken that where there are more than five steps between the shaft and the prime mover and the point of final application of the power, it is possible to gain a higher efficiency by electric than by mechanical transmission. For example, starting from the engine shaft, a belt or rope is taken to a main shaft –step one, to a counter-shaft on another floor– step two, across a room —step three; to the machine countershaft step four, to the machine itself—step five. The total loss in transmission under favorable circumstances would probably be not less than 5 per cent. for each step, or say 25 per cent. in all. The loss by electric transmission would certainly be reduced below this amount, and economy in working expense would result, even where the machinery is in constant use in both cases. Any irregularity in or interruption to the use of the power at the point of ap