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How Electricity May Be Used to Operate Machinery

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This is a problem which has been solved only within the last few years; for not until recently has enough been known about the methods to make it practicable. Although dynamos have been used some time for electric lighting purposes, they have not been employed for operating machinery. Motors were only seen in laboratories for experimental purposes. They are now used almost exclusively for running street cars. But this essay is concerned with electricity in the machine shop. Many establishments are beginning to see the numerous advantages that this system has over the old method of transmitting power by means of belts and shafting, and are putting in electric plants. The first successful machine shop in this country to be so equipped was fitted up in 1888, and it is still running.

We will consider this subject by speaking first of the disadvantages of the old system, in which all the power is transmitted by belts and shafts and gears. These are very expensive, and the cost of them and of the labor in setting up is often as great as that of the steam plant. In the case of a large manufacturing establishment, where there is a number of machine shops, foundries, and so on in the several buildings, the expense of operating the machinery is enormous. In a foundry one hundred feet long with a number of small cranes run from a shaft the whole length, the cost is considerable; and as the shaft is so long, there is a great strain upon it.

Belts and shafting obstruct the shop to a considerable extent, so that insome cases it is hard to tell where to put a ladder in order to oil the shafting. Unless there is an equal number of machines on each side of the shaft, the appearance is unsightly, and there is also an unequal strain, in the shaft tending to bend it. Belts and shafts are a great source of accident to the working men, many of them being disabled or killed every year by getting caught in the belts or pulleys.

In this system, the machinery locations are greatly limited. They must be within a certain distance of the shaft or too much power is lost. If one wishes to move a machine after it has once been set up for better light or any other reason, it is something of a task, as one will have to change the counter-shaft and pulley and set the machine true, which takes some time. The engine must also be stopped; and this in a large shop means a considerable loss, if stopped for a minute only. The same is also true to a certain extent of putting in new machinery.

We now come to the most important disadvantage, which is the great loss of power due to friction. In some of the best regulated machine shops, it has been estimated that at least sixty per cent of the power is spent in turning the shafts; and in most establishments even more power is lost in this way, while there are very few that fall as low as fifty per cent. So we see what a chance there is to economize in just this point. Even if we have only a single machine running, we have to turn all the shafting for just that one machine, and this means the dead loss of a considerable sum.

Another thing which occasions considerable annoyance is the dripping of oil from the hangers; and although there are drip pans under them, these get full after a while, and it seems to be noones' business to empty them.

There is usually considerable noise and jar in this system, and so the building has to be made much stronger than it ordinarily would be. The noise is very unpleasant to most people until they get used to it, when they do not mind it so much.

We will now speak of the advantages of the electrical system. There should be a motor at each machine; and if one wished to run a single machine, one would use just power enough for that, which would save a considerable sum as compared with the old system.

A motor costs no more than belts and shafting and the other necessary things which go with them; as, pulleys, hangers, counter-shafts, lacings, and is much neater and cleaner in every respect. In a few years when more firms manufacture motors, they will probably be much cheaper.

Again, if a manufacturer wishes to put in a new machine, all he has to do is to set his machine in the most desirable place, run the wire to his motor, and he is all ready for work. He can set his machines up in one-quarter of the time that it would have taken him in the old way and at a far less cost.

Furthermore, the first cost in starting a machine shop is less, as much smaller engines and boilers can be used. As over one-half of the power is spent in turning the shaft in the belt and shafting system, in the electrical, than one-half power can be saved and only one-half as large engines and boilers need be bought, which in large machine shops means a great saving.

Supposing one is near the Rocky Mountains and there is a good-sized water-fall close by with room enough for a machine shop, but it would be hard work getting up there. In such a case, all one would have to do would be to put in a water wheel, a dynamo, and a small house to hold them. Then if one wished to have one's machine shop beside a railroad orany other suitable location within five,ten , or fifteen miles of the waterfall, wires could be run to the machine shop, and one would have all the power wanted, and at a minimum cost.

There is very little noise or jar with this system; so that if a machine shop in the basement of College Hall were equipped in thi this way, those on the next floor would not know it was there unless told.

Summing up the advantages of the electrical system in a few words, we find that we have less dust, noise, jar, accident, and cost, and we have gained more light and power.