

known, that when perfectly good orders issued by the management fail to produce the expected results, the cause can almost invariably be traced to the fact that it was expected that the new order would take place by itself. The old, good saying that the best way to doom a thing to failure is to give it "a fair trial" is always true whenever a capable man is not made responsible for its success. Whereas these considerations are equally applicable to training workmen in any line of work, the power plant presents a number of special problems in connection with education. Sometimes the most rudimentary knowledge of chemistry and the laws of physics is sufficient, as for firemen,

can do in forming the habits of securing uniform results may be gained from Figs. 9 and 10. The first table graphically represents the irregularity of work and poor results gradually changing into steady work and uniformly good results attained by firemen under a proper method of training. The second diagram represents the result of well-trained switchboard operators who had to comply with most exacting requirements of a contract under which about one-third of the power consumed by the company is purchased. With fluctuating power consumption from day to day and from hour to hour within a wide margin, with inversely fluctuating pro-

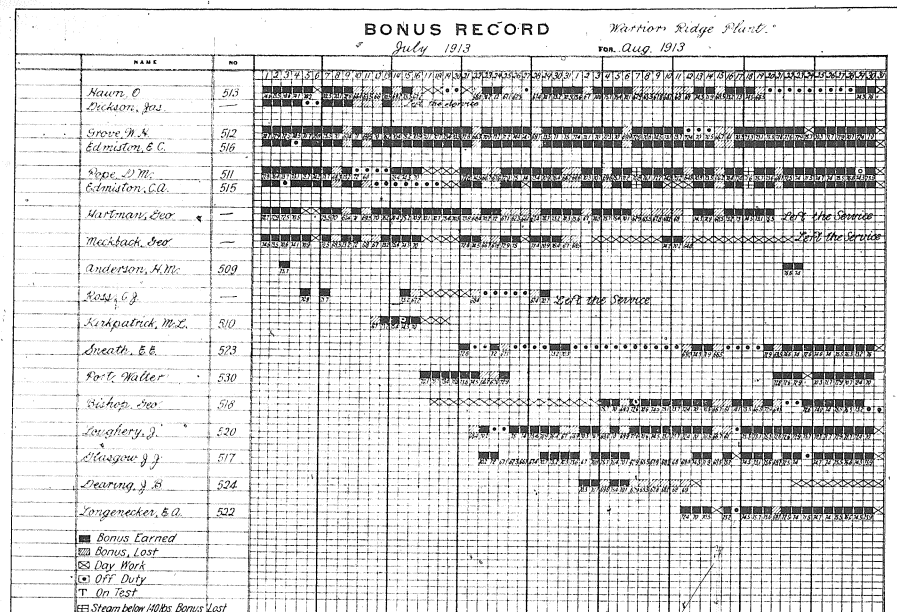


FIG. 9. Bonus Record of Firemen Just Started on Task Work.

while in other cases more profound insight into the scientific basis of things is essential, as it sometimes is with electricians. Our "engineering letters" form the foundation for subsequent discussions, lectures and other phases of an educational campaign. It would be manifestly erroneous to think that the job of an instructor is a temporary one. It is as permanent as the plant itself, inasmuch as men, supplies, conditions and requirements gradually change; new investigations shall be carried out, and to meet the changing circumstances the management must convey the revised information to the men, constantly making available the gain in knowledge.

11. An idea of what persistent, thorough training

portion of purchased power and without any automatic means of regulation or cutting off, the excess of purchased power, the operators were enabled by training, assisted by a special slide rule, to keep the hourly load factor remarkably uniform, thereby saving the company the severe penalty provided in the contract for excess-load factor, at the same time consuming the full amount of contracted power and protecting the company from paying for unconsumed energy below the minimum figure stipulated in the contract.

12. Whereas the proper selection and careful promotion of the employees is an important function of management, the value of it is often over emphasized,

particularly when the number of available men to select from is limited. The importance of careful and profound training, to the contrary, becomes more pronounced when in addition to the limited labor market an attempt is made to secure uniformly good results from every man on the shift and every shift in the plant. The old-fashioned habit to look for and employ "ready-made" men has had its excuse in Europe, where trade and its tricks were guarded by guilds and conveyed from father to son; it showed little harm in industries where machinery and work

related to this subject of "making knowledge available" that it will be referred to here. The instructors and work-bosses are responsible for teaching men correct methods; therefore their bonus is based not on the economic result accomplished in their departments or by their gangs directly, but indirectly; namely, on the basis of the number of their pupils that succeed in learning how to do the work in the right manner. The boss' reward is thus a fixed bonus for each man in his gang that earns the bonus. This figure is materially increased, in some cases doubled, when all men under his leadership earn their bonuses. This offers a strong incentive to pay the most attention to the training of the most backward ones.

MAKING THE KNOWLEDGE APPLICABLE

13. Correct and complete knowledge of what is the right thing to do and what is the right way to do it is of no avail unless the man is taught to perform his duties in the required manner. Now the question is whether he is willing to learn the new way and undergo the strain of unlearning the old habitual one. Like leaving off smoking or walking with toes turned outward, the will-power must be stimulated by an incentive sufficiently attractive to be worth the effort. The reward is a natural inducement, yet regulation wages and a desire to hold the job are rarely, if ever, regarded as anything more than a moral obligation on the part of the employer to provide his employee with the means for existence. Moreover, the increased cost of living, more exacting demands and clearer conception of economic relations constantly work on the mind of the employee, taking periodically the form of demands for an increase of wages.

14. There are two ways of inducing a man to do something—forcing him to it, and making it desirable to him. The advocates of strict military discipline are apt to imagine that the new habits can be forced on the men by fear of dismissal or milder disciplinary measures. This may work so long as the men do not see their way out of the pressure, which usually does not take very long; then the newcomers must be again forced into the régime at great expense of time and energy. Meanwhile an elaborate system of espionage, bossism and pressure must be brought into play if the rule is really to be enforced, otherwise the things are done in the prescribed manner only while men are under surveillance, or more often it only appears so to the casual observers and to the imagination of the advocates of "big-stick" rule.

The obvious advantages of leading and stimulation are:

- Less effort needed to lead than to push.
- Voluntary action is performed even when not watched; therefore, the desirable method is followed permanently.

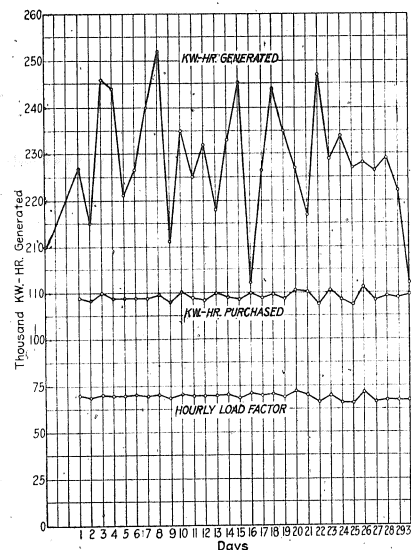


FIG. 10. Record Showing Regulation by Well-Trained Switch-Board Operators of Consumption of Purchased Power in Compliance with Terms of Contract.

were alike in almost every shop. But with the fast development of power-generating equipment and appliances, with widely varying condition and an endless variety of combinations of both, the requirements changed. It is not manual skill nor is it hardened experience brought over from elsewhere, but the ability to acquire new knowledge and to form new habits that is counted as the paramount requirement of every applicant for a power-plant job. It is the duty of the management to mold the proper habits by friendly and persistent training continued day in and day out. No employee should be left to himself until the method known to be the best under a given circumstance becomes a new habit with the man.

While the question of inducement and rewards will be treated elsewhere in this paper, a special case of paying bonus to instructors and bosses is so closely