

with the regular machine tools, preferably of the various makes and kinds, adapted to a great variety of work, from bolt and pipe cutting to the grinding and measuring machine. Adjoining, or in an adjacent building, have rooms for drafting, recitations, lectures, and a library, and, reversing the usual order, make these features attachments to the shop. Select men for teachers and instructors for the shop proper, whose sole qualifications are that they know how to do work, how to go to work to do a job, who are ready in resources and know the kinks in the trade, entirely regardless of whether they know how to design machinery, whether they know what makes a steam engine go, or whether they can read or write, except if a man knows how to read he may be better able to find out other people's ways, and therefore be the better man for the place. Select for teachers in the drawing-rooms, class-rooms and lecture platform, men from the ranks, but never from the ranks of its own pupils. But shop, tools and men should all aim towards the objective point, educating young men to be good machinists (not engineers whose business it is to know how and why), but workmen who shall know how to do. In selecting the pupils avoid all educational tests, selecting, as would the manufacturer, boys for apprentices by their ability and disposition to work, and those who will take pride in their handicraft achievements. Let them understand that they keep their places by the result of their labor, and drop out those that fail, precisely as students are dropped from other schools, though not from any failure in their studies, but when they fail in their work. It is no more possible to make a good workman out of an inappropriate stock than it is anything else, animate or inanimate.

Avoid the two great evils of the present schools and colleges, that is, the examination and diplomas. Advance each young man as fast as his ability and energy will take him, and as soon as a reasonable opening offers, put the fellow best able to fill it in the place.

In the course of training require eight hours a day, five and one-half days in a week, and at least fifty weeks in a year of faithful shop work; two hours a day, five days in the week, for study, recitations or drawing, and two hours each evening, five days in the week, for writing, lectures and study. In this four hours a day not only all can be taught that that class of men who are to be the mechanics of the future can remember, and three or four years of training of this kind will not only make the best of workmen, but workmen educated up to the highest point that will ever be of any use to them. If a workman can figure whatever comes to him to do in his business, if he can write a good letter or a good description of what he has to do, or work with, and if he can read understandingly, he has about all that can do him any good, as a workman. If he is better educated he may be a better or a worse man, according as he makes use of that education; that it always makes him a better citizen is belied every day in the year; that it always makes him a more reliable voter is belied in every charter election. The only education that *never* fails to make a man better is that education that teaches him how to earn a living by work.

The educational facilities should be such as are necessary to fit a young man to enter a technical

school, so that where one shows the ability and the inclination to go beyond the scope of the industrial branch, he would in no way be hindered, but rather fitted for it.

The library of the industrial college need not contain a book worth more than a dollar or two. Let the library be a free circulating one without a librarian, and the one or two thousand dollars usually paid to a librarian as salary be expended in buying half a thousand books to replace those carried off or worn out during the year. Make the entire machine shop a tool-room, and each and every apprentice a tool-room boy.

There is no reason why the whole place should not be managed with the same discipline as a school, except where in some respects the school rules would be useless.

As to the class of work, build the same things built in other shops, and sell them in the open market for what they will bring. As time expended on the work is an element of no cost, the work after the third year could be certainly as well done as the average shop work, and, too, as the work cost does not enter into the product, all sorts of machines and tools could be built, and one of the best places imaginable to test new ideas provided. By doing this class of work no antagonism would be engendered with the regular outside shops; furnishing them with good men would gain friendship and aid, and any opposition from the trades union would only arouse public indignation, against which nothing but right can succeed. We can readily anticipate a score of objections that will be raised to this proposition.

First, it will be said it cannot be made to pay; in dollars and cents, no one with experience would expect it could; no school pays in that sense; but with the tuition fees, with the work free, with shop tools and power furnished, with instructors at small salaries, the drain on the endowment would be nothing comparable to that of the literary or technical colleges of the same magnitude.

Second, it will be said, good and salable work cannot be done if nothing but apprentice labor is employed. In reply to that, it is only necessary to say that the work need not be wholly confined to apprentice labor. Besides, it is well known that at one time at Cornell University there was done, by student labor alone, and, too, students working but two hours a day, regular machine shop work comparable, and in some respects superior to the average work done in the regular shops. To keep the commercial side of the work before the apprentices, that is, to teach them how to do work, and how to do it in a paying time, teaching the best way at first, and during the last year compelling them to work by the piece, and giving them the benefit of their work, will do more than all talk, or all the outside experience possible, except where piece work is practiced.

Third, it will be doubted if enough young men can be found, whose parents will have the disposition, and can afford to pay the tuition fee, where the custom has been to have the compensation go the other way. But when it is understood that there are hundreds of apprentices in England, where hundreds of pounds are paid for the opportunity, and one receives constant offers of compensation, as we do, there need be no doubt on that score.