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WORKMEN AND THEIR INSTRUCTORS.

That there is a gulf between the purely practical man and his teacher the theorist is one of the misfortunes of our day; and that there exists between them a lack of appreciation, one of the other, is painfully apparent to anybody who comes into contact with them both. Neither will allow that a goodly store of the knowledge and experience possessed by the other would not be a decisive benefit to him. But the theorist well knows that the efforts he may make in purely practical pursuits, however successful from a mechanical point of view, are sure to be, comparatively, financial failures: or, in other words, the expert workman must as a rule look for financial success in the same degree as he abandons his practice and enters the domain of theory. It is a very easy matter to quote examples of great men, who, like Galileo, threw their whole life and soul into their studies, and, rising to the pinnacle of fame, made the world their debtors; but how would it have been if Galileo had known that, so soon as he had advanced to a certain height in knowledge of his beloved science, he must, to advance any further, abandon it and enter an arena new to him? And this is the precise position of the expert workman. The day has gone by when fame alone is a sufficient reward for labor or skill. Diogenes would in our day find his tub kicked into the street, and himself under lock and key as a vagrant. Galileo would be sneered at as a visionary; while ordinary good breeding prohibits enthusiasm, which is now-a-days considered an attribute of youth or inexperience. The ordinary mechanic of to-day is a child of to-day, with its ruling passions well developed in him. Among those passions a desire, a greed almost, for money is not the least; and he naturally takes the readiest course to obtain it. Now what is that course? Is it to become a skillful, practical mechanic? By no means: it is to learn the most commonly known method of doing work, the principles, so far as generally known, governing the manipulation or construction of the work or machine, as the case may be. In fact, since to take charge of others is his aim, he only exerts himself to gain sufficient knowledge to enable him to do so. The shop manipulation, knowledge of business, force of character, mathematics, mechanical drawing, etc., necessary to the attainment of his object, he strives to master. The better his education, the more sure he is to rise; so that a really intelligent and well educated man, with ordinary exertion, is rarely found in the working mechanic, even if he has had ten or twelve years of experience. As he drifts away from his position as a workman, he drifts away from its elements; as a working foreman, his studies are less practically manipulative; he has spent perhaps five years at his business, and during that time his attention has been divided between two things, one to become as expert a workman as he can, the other to gain the extra knowledge necessary to bring him into notice and make him capable of managing and directing other men; and so soon as he makes the first step of advancement, his progress in acquiring manipulative skill is cut short. This is of course unavoidable; but it leads to consequences, as we shall presently see, that are not unavoidable, but are on the other hand very deplorable. As a superintendent he enters a new field, in which his purely practical knowledge is of comparatively little value to him; yet he is the representative head and front of the purely practical man, and will often aspire to a superior knowledge of even the practical workmanship. The expert workman, who has spent from 12 to 20 years in the workshop, and who, in addition to being naturally and mechanically skillful, has made the work his study, looks around him in the workshop and sees here a machine running too slow, there a workman who would do double his quantity of work if a little of that inside information, which old and skillful mechanics always possess, were imparted to him. Then he thinks how much more work could be got out of the same amount of men and machinery if they only knew what he knows. He smiles to himself, and dismisses the subject from his mind, feeling that in his sphere of knowledge he stands alone; conscious, perhaps, that he could not fill the position of even a foreman, but conscious at the same time that money is being thrown away, and that, so far as the practical workmanship is concerned, those above him do not know their business, at least not as he knows it. He has not only no enthusiasm, therefore, for those above him, but he has innately a poor opinion of them, and inwardly rebels at his own position. There is his field of usefulness a comparative waste; and his mechanical advancement is impossible, because: Here we may pause and repeat a woman's reason: Because. The truth is that he is not supposed to know anything, and for the simple reason that his judges were never in his element. They might have attained to his knowledge, but they left his field of study and do not know that it takes twenty years to become, on light work only, an expert workman at the lathe, machine, and vise.

What are the chances of combining in one man, first, a mechanic sufficiently expert as a workman to stand legitimately as an authority and teacher to a large shop of workmen, secondly, one with sufficient judgment and command to govern them, and thirdly, one who shall also be an expert theoretical engineer? Let us see. Out of every 100 turners, there will be found not more than 2 of the highest order of efficiency. Out of 100 workmen, not more than 5 at most are capable of taking charge of men. Out of 100 men, not more than 5 are expert at the planer as well as the lathe; then again, not more than 5 in 100 are capable of explaining even what they do know. Out of every 100, there may be also 5 who have a knowledge of mathematics sufficient to make the calculations absolutely necessary to their work, if required to do so; then, perhaps, 5 per cent of

workmen can make a decent mechanical drawing. But, on the other hand, 5 per cent are unsteady, 5 per cent are comparatively untutored, and so on; so that the chance of finding the above-mentioned combination in one man is somewhat small. It becomes apparent, then, that as a rule it is not the most useful workmen who are promoted into better positions, for the reason that the requisites to fill those positions include requirements other than manipulative skill: which requirements in the aggregate give practical expertness a comparatively small place in the general qualification of the foreman. Thus it happens that we may find a hundred cases wherein the workmen of a shop have a profound respect for some particularly expert workman, while only one case in which such respect is entertained by the workmen for the foreman of a shop; and it generally happens that, where such respect does exist, it is a bar to the advancement of the expert for the reason of the impossibility of his assuming control over men with whom his relations have been so intimate. That this should be so is not at all unreasonable, because his superiority is brought before them almost every day of their lives. He is to them, to a certain extent, a mystery in and upon a matter in which they themselves are, to themselves, masters; for of what does the ordinary mechanic assume to know more than of the trade at which he spends his days from morning till night, year in and year out? When a mechanic exerts himself to his utmost, when he puts forth the whole strength of his muscles as well as of his mind, when he calls to his aid all his experience, all his knowledge, all his determination, and all his strength, and then fails, and meets another who, with the same tools and under the same conditions, can perform vastly more and superior work, he knows that this capability is not due to either advantages of brute force or school education, but to some indefinable qualification known as skill. This seems to him to set education, perseverance, and strength at defiance; then respect creeps in, and the skill becomes a shrine, and its possessor an idol. An example of this kind occurs to our mind. A tall strong man, with brawny arms and with muscles hard and well developed, was engaged in filing up some parallel bars; he had the work by contract, and had filed up scores of them. He was an experienced mechanic, and had gotten himself into trouble for working so quickly as to get those men who chanced to have the same work to do by day's work into disrepute, because of their inability to compete with them, even in cost, let alone in time. On one occasion, however, a somewhat delicate looking workman, who worked near, challenged him to file up a bar in competition with himself (the challenger). The gauntlet thus thrown down was accepted, and for three hours the contest raged. Each was allowed new rough, second cut, and smooth files; and the excitement among the other workmen, of whom there were eight, ranged along the side of the same bench, was at a high pitch. The challenger finished his work first, and it was examined by his opponent and pronounced well executed; but a repetition of the trial of skill was requested, and made, with the same result. It was in winter; the workshop had no heating apparatus of any kind, and, though it was freezing, the contestants were in their shirt sleeves, and yet were perspiring. Then the challenger was thus addressed by his opponent, who had ceased working and had been engaged a few moments in apparent deep thought: "I cannot understand it; I can only accept and respect it. I have nearly twice your strength, and have had ten years more experience. I can look clear over your head, and can hold you with one hand; and yet I am beaten, beaten at my own job too; and worse than all, I cannot for the life of me tell how it was done." He surveyed himself, held out his strong arms and looked at them, then shrugged his shoulders and went on with his work. He might look within himself, and find, so far as his understanding was capable of judging, every element of superiority, except in that mysterious, intangible, indescribable qualification known to him under the cognomen of skill, which the closest scrutiny of the most experienced eye cannot detect save in its results.

ANCIENT GRECIAN GLASS.

Among the rare objects discovered in ancient Grecian burial places are some curious ones of glass, mostly found in the graves of women. Frequently these consist of vessels with long necks, drinking vessels (without handles and round at the bottom), and of flat and open dishes. All these glass objects appear to have been articles of luxury, and not domestic utensils. According to the recent investigations of Professor Landerers in Athens, this glass is usually a silicate of soda, sometimes of potassa; but it is always very rich in lead oxide. These wonderful ancient productions often show the most magnificent rainbow colors, with a metallic luster like polished gold and silver, and the material of which they are formed may be split up into very thin layers. That this peculiar appearance is the result of old age, which has produced a change in the material, may be seen in the glass vessels preserved in the Metropolitan Museum of Art, in New York city, which are of still older date, having been procured from the island of Cyprus, by General Di Cesnola. These objects belong to a period of time intermediate between the ancient Egyptian and the Grecian periods; and the coloring operation is the same as that which takes place on the surface of glass panes in windows exposed to continuous changes in moisture and dryness. But it is found in its most complete result when, in the course of centuries, the action of time penetrates the whole mass, forming layer upon layer, shining with the colors of soap bubbles or mother-of-pearl, but with much greater intensity.