

21st. Wind storms, 6th, 18th. Fog, 7th. Bain, 6th, 15th, 16th, 18th, 19th, 25th—28th.

STRATFORD.—Lightning, 2nd. Lightning and thunder, with rain, 18th. Frost, 11th, 12th, 14th, 18th (ice), 20th—22nd, 29th, 30th. Wind storm, 18th. Fogs, 12th, 16th, 21st. Rain, 10th, 14th, 15th, 17th, 18th, 25th—27th. Difference of mean temperature for the month over average of 10 years was  $-4^{\circ}01$ . Scarlet fever prevalent in the town.

HAMILTON.—Lightning, 2nd, 18th. 13th, very smoky all day. Frost, 18th, 26th—22nd (severe). Wind storms, 23rd, 26th. Rain, 6th, 10th, 15th, 18th, 25th, 26th.

WINDSOR.—Lightning, 2nd. Meteor in E, towards NE.; meteor in Z, towards N, 4th; meteor in W, towards NW, 5th. Lunar halo, 21st, 26th, 28th. Frost, 18th, 29th, 30th. Wind storms, 9th, 10th, 14th, 22nd. Fogs, 4th, 5th, 8th, 16th, 22nd. Rain, 14th, 15th, 25th. Like last month, this has been characterized by the extreme dryness of the weather, by the total absence of thunder storms, and by the prevalence of destructive fires.

## V. Papers on Technical Instruction.

### 1. POPULAR SCIENTIFIC SCHOOLS IN GERMANY, FRANCE AND SWITZERLAND.

From one, judge of all. From brief outline of the educational condition of Wurtemberg may be approximately inferred that of the generality of German States, among which Wurtemberg stands educationally about midway, somewhat higher than most, somewhat below one or two. Not of Wurtemberg only, therefore, but of Germany as a whole, may France acknowledge the educational superiority. Yet, even as France looks up to Germany, may Germany in turn look up to Switzerland, which—having under the auspices of Pestalozzi anticipated both her neighbours in combining the teaching of thoughts and things with that of words—has, during the last seventeen years, gone beyond either in combining instruction in the real business of life with instructions in abstract science. In private and personal expenditure the Swiss are as frugal, not to say stingy, as we are profuse. Their common schools are mansions, their academies look like town-halls; in their national polytechnic at Zurich—an edifice as grandiose as Buckingham Palace—is located the best model of a technical university which the world can show, the most perfect and symmetrical organization for training a rising generation in the practical duties of citizenship. In it everything that is most valuable in the arts or manufactures of other countries is taught by the most competent teachers anywhere procurable, in the best manner that experience can suggest, and with all the aid that the best material appliances can afford. There, as in the kindred establishment at Stutgardt, are an astronomical observatory, a chemico-mechanical laboratory, a laboratory of chemical research, a museum of engineering work and drawings, a museum of engines and machinery, a museum of architecture, collections—antiquarian, zoological, botanic, and geological. There a tutorial staff, sixty strong, deliver annually 145 courses of lectures, in groups adapted to the varying requirements of all who are either themselves ambitious of taking the lead in any technical career, or propose to make it their business to promote the technical progress of others—suited, that is, to agriculturists, manufacturers, mechanics, engineers and architects, to the general and political philosopher and the politician, and to all beside who either cultivate science, or art or literature for its own sake, or take it up as a profession. If now—recollecting that these several sets of educational apparatus were designed for the express purpose of enabling the countries to which they respectively belong to make up, by the more effective application of science to industry, for their inferiority to England in other conditions of industrial success—we proceed anxiously to inquire how far that purpose had been attained, we shall find all testimony continuing equally concurrent. Contrasting the textile products of France, Belgium, Prussia and Austria, with those of Great Britain, "Here," exclaims Mr. Huth, "is a machine working a machine; there, brain sits at the loom, and intelligence stands at the wheel." The previous training, whereby "in the polytechnic schools of Germany and Switzerland, the future manufacturer or manager is made familiar with the laws of the great natural force that must always form the basis of every intelligent industry," is pronounced by Professor Frankland to "more than overbalance the undoubted advantages which our own country possesses in raw material." "Englishmen," says Mr. Mundella, "possess more energy, enterprise, and inventiveness than any other European nation; but the best machines which Englishmen invent Germans and Frenchmen are enabled, by superior industrial education, to improve upon." While, "in Saxony, sons of the poorest workman receive a technical education such as the sons of our richest manufacturers cannot hope to obtain, how, asks the

same keen observer, can it be otherwise than that the English workmen should be gradually losing in the race?" Gradually losing, forsooth! Nay, rather does Mr. Lucraft feel bound to confess that "in the race we are nowhere; that our defeat is as ignominious and disastrous as it is possible to conceive;" that since 1862 we have "not only not made progress, but have retrograded," and that because "the mere mechanical workman has not the slightest chance with the workman of cultivated taste." It is "the Frenchman's familiarity with art," says Mr. Conolly, "and his early training in its principles, that enables him to outstrip us," inasmuch that "we are becoming reduced to mere hewers of wood and drawers of water for other nations, manufacturing goods to be sold cheap, or producing raw material for them to work up;" but, as Mr. Randall adds, in the same strain, betraying our deficiencies "wherever intellectualism is concerned or an educated hand is required." Everywhere in the manufacturing establishments of the Continent, Mr. Samuelson found people of higher culture than our own, handworkers comparatively literate, foremen and managers with well-stored and well-exercised heads, masters often highly and variously accomplished. Such being the admitted difference in mental attainments between English and Continental directors and performers of labour, let us reflect on what the difference implies. That, whatever be the task, workmen in the habit of using their brains as well as their hands will do it better than those who are not, will do it with less waste of time, exertion, and material, and will turn out work both fitter in itself and that will fit better into whatever other work it is to be combined with, is too clear to need pointing out; that managers whose only rule is that of thumb will, when in cases of novelty, obliged to proceed by trial, be more likely to proceed by error also than if they had ascertained principles to guide them, is equally obvious; nor is it much less evident that a principal's or proprietor's competence to the supreme control of a great industrial business will be proportionate to his comprehension of the processes which the business involves. What it may be somewhat less superfluous to note is, how greatly technical ignorance on the part of the employers aggravates the evil of similar ignorance among the employed, and *vice versa*, and how greatly the want of technical knowledge on one side tends to neutralise the efficacy of such knowledge on the other. Even bad workmen have a strong motive for doing as well as they can when working for a master who is a judge of work, while good workmen will be discouraged from putting forth their skill for the sake of a master who cannot tell good work from bad. Those who see that they will not get credit for doing their best will be apt to content themselves with doing the worst that will pass muster, and when the workmanship of all is brought to the same dead level of badness, the unionist demand that all shall be paid alike no longer sounds unreasonable. Or if it be the master with whom is superiority of capacity, then, before venturing to introduce improved methods, he has to consider what his pig-headed foreman will have to say to such new-fangled notions, and, before trusting his workmen with delicate mechanism, to reflect whether their clumsy hands will not be sure to put it out of order. Plainly the odds are too great against establishments conducted under such disadvantages in rivalry with those in which authority graduates upwards *pari passu* with merit, where masters are competent to instruct managers, and managers to direct workmen, managers and workmen looking upwards for instruction or direction accordingly—and where members of all grades, deserving and desiring each other's esteem, feel their common honour involved in the excellence of their joint productions.—"Technical Education in England," in the *Cornhill Magazine*.

### 2. TECHNICAL EDUCATION.

The Dutch technical schools and prison system will bear comparison with any other country, and in very few will be found any systems productive of better results, so far as educating the youth and repressing crime are concerned. Capital punishment was abolished in Holland years since, and the cellular system with total separation from criminal companionship day and night, introduced instead; but the prisoners are constantly visited by teachers and religious instructors, and by charitably disposed persons under Government authorization. Thus the prisoners are preserved from further contamination and hear nothing but wholesome counsels. There is no pauperism in Holland, and workmen of all descriptions find general employment, though wages are lower than in many other countries. The cause of this general industry is owing in a great measure to the technical schools, or, as those institutions are termed, "Ambacht" for the education of the poor. Such schools are to be found in Amsterdam, Rotterdam, Groningen, Saardam, &c.