up a set of local governments in the shape of corporations, which hold their employees with a sovereign hand. They are not to blame for the despotism they exercise: that is in the nature of things; nevertheless, this necessary power brings its measure of duties with it. If they will only see, that among those duties which they owe to their subjects is that of giving them help in escaping the evil consequences of their position as far as is consistent with their necessary labor, they will do much to secure their best interests in the future. Considered in a large way, there is no doubt that such efforts as this of President Garratt would prove so immediately profitable, that they could fairly find their way into the balance-sheet of a corporation. The good-will of the dependents of such a principality as a great railway is really a part of its assets; as an insurance against the portentous dangers of grave discontent, it is of inestimable value.

Let us hope that our great corporations will follow this good example, and that in time they will become as powerful agents of intellectual as they have been of economic progress.

THE WATCHMAKING INDUSTRY IN SWITZERLAND.

I have taken advantage of a short stay in this country to learn something of the watchmaking industry. The importance of this branch of manufacture to Switzerland is familiar to all, but not every one has an idea of the national character which it assumes. Locle and Chaux-de-Fonds are two cities an hour's walk apart, containing together between 30,000 and 35,000 inhabitants, with whom watchmaking — or, rather, making the different parts of a watch — is almost the sole business. The business directory is classified into occupations so minute as cutting the figures on watch-faces. The catalogue of individuals or firms who make hands of watches contains, like our own directories, occasional notices of specialties in the manufacture of hands. Special schools of horology are established by the state, in order that nothing may be left undone to save the national supremacy, which has been so endangered by American competition. The result of this competition on the Swiss watch manufacture is a subject worthy of attention from all who are interested in accurate horology.

The general depression produced ten years ago by the competition of the machine-made watches of Waltham and Elgin is well known; but the statements of it were either somewhat exaggerated, or there has been a great recovery. It must be remembered that these Swiss watchmakers were not the unfortunate, half-starved paupers described by some of our American economists, but men, who, by hereditary skill and careful training, had acquired a remarkable proficiency in their art. I have been assured that the best workmen in some of the branches were able to earn as much as a hundred francs a day; and this in a country of most economical habits. Here was a wide margin for retrenchment when the storm came. It was, of course, necessary for the Swiss to cheapen their products; but policy and national pride also urged the better course of improving the quality of their work. Among us, twenty or thirty years ago, Swiss watches were noted for their cheapness rather than their excellence; and, when an American wanted the best kind of a time-keeper, he sent to London or Copenhagen. The Swiss saw that the best way to recover their lost advantage was to apply their skill in doing what machinery could not do, — making a finer finish and more delicate adjustments. In this they claim to have been so successful as to defy competition, having repeatedly won prizes at exhibitions where American watches and their own were placed on trial. How far this claim may be well founded I am unable to say; but the data for judging of the character of the improvement are fortunately at hand, in a state which readily admits of presentation. The observatory of Neuchâtel was established, and an able astronomer (Dr. Hirsch) placed in charge, for the especial benefit of the watchmakers. The best watches and chronometers, to the number of several hundred per year, are here tested, the results published, and prizes awarded to those which fulfil certain conditions. The principal data on which the judgment is based are, —

1. The average difference between the daily rate of the watch on one day and on the day following.

2. The changes of daily rate produced by changes of position. In the severer tests the watch is tried in four positions, — lying flat, suspended in the usual way, handle to the right, handle to the left. The large majority are tested only in the first two positions.

The mean results for some years, in the following table, show how great the improvement which has been made: —

Year.	Mean change of daily rate in a day.	Difference in two positions.
	Seconds.	Seconds.
1862	1.61	–
1863	1.28	–
1864	1.27	8.21
1865	0.88	6.18
1866	0.74	3.56
1867	0.66	3.57
1868	0.57	2.44

From 1868 the improvement, though well marked, is rather slow. The mean result for the three years, 1879–81, is, —

	Sec.
Mean difference between daily rates on two consecutive days	0.53
Difference of rate when flat and vertical	1.84
Sum of the variations in all four positions	8.23

It would be interesting to know how these numbers compare with the corresponding ones for American watches. But in no other country than Switzerland are the public interests so deeply involved that such data are officially published. We know that the Waltham watches, and probably those of all other American factories, are adjusted with the greatest care, to have, as nearly as possible, the same rate in different positions; but we do not know how near they approach precision, nor how they would stand the test after being a few months outside the factory.

After all, the practical question is not so much how good a watch is it possible to make, as how cheaply can you make a watch of the first class. One has long been able to get as good a watch as could be made from Frodsham or Jurgensen by paying from $300 to $500 for it. What the world has gained by the revolution is the ability to command a watch equal, or but little inferior, to the best, at less than half the old price. Here seem to lie, at the present time, the best grounds for the claim of superiority on the part of the Swiss. I am informed that the best anchor escapement watches, such as those whose performance is given in the preceding table, are sold in gold cases for $120, manufacturer's price: this for watches that cannot be exceeded in quality. Can any American company do as well as this?

The Swiss manufacturers have not been slow to avail themselves of the American system of machinery, but I doubt whether they have been able to bring the system to the perfection which it has attained at Waltham. There are two or three great factories on the American plan; but I have not had an opportunity to visit any of them. Owing to the want of steam and water power, and the habit of having the operatives work at home, only such machinery as each man can manage for himself is available at the great centres. Such is the case at Locle and Chaux-de-Fonds. That this is a great disadvantage can hardly be doubted.

A point which the official Swiss tests do not sufficiently consider is the isochronism of the balance under changes of pressure. The Swiss follow the American plan of dispensing with the fusee and chain, and winding up the mainspring from the centre. A great advantage is thus gained in simplicity of structure and freedom from accident; the frequent breaking of the chain, in former times, having been the greatest source of annoyance to the owners of watches. But, if great accuracy of running is aimed at, we now have the disadvantage that the spring acts with greater force when the watch is first wound up, and that the pressure continually diminishes as the watch runs down. The change of rate between day and night thus arising may exceed the variations from all other causes combined. To avoid this difficulty, each balance and hair-spring has to be adjusted by repeated trial; and the perfection of the adjustment should, in all cases, be one of the subjects of any scientific test. This gives rise to an ulterior question, on which I am not quite satisfied. One carries the most perfectly adjusted watch in his pocket for two or three years, and then has to hand it to a watchmaker to be cleaned and oiled. Will the watchmaker be able to put it together again, in perfect adjustment, without spending on it the same time, trouble, and skill which was originally spent by the maker? If this question is to be answered in the negative, it will practically be a waste of labor to perfect the pocket-watch further without re-introducing the fusee and chain. But in these times, when every one who wants accurate time can get it without trouble, an error of a few seconds a day in the running of a watch will be a less evil than the liability to accident from the breaking of the chain. S. N.

Neuchâtel, March 12, 1883.

THE TAGALS OF LUZON.

THE present natives of the Philippines are generally believed to be of Malay origin, and to have been carried there from the Pacific islands involuntarily by the monsoons, or purposely by migration. They have the same form, character, and habits, as the more barbarous branches of the same race, though of more agreeable and manly features. Those of the southern islands look more like Malays than do the Tagals of Luzon, who are more or