AMERICAN MECHANICAL GENIUS.

BY W. J. STILLMAN.

The World's Fair, lately closed, has, like the previousones, been a great triumph for American inventors. The victory was so clear and so remarkable that one might say, as in the yacht race, where the America won her blue ribbon, that no nation was second. The case has given rise to some discussion, and the London *Times*, in its editorial comments on the subject, takes the simple and comprehensive ground that the admitted superiority is due solely to the necessity of providing for deficient labor by mechanical contrivance. This would be a satisfactory solution, *to Englishmen*, if it could be maintained; but, unfortunately, it does not account for the facts; it is a plausible but incomplete theory, that would account for many new inventions, but not for the better workmanship which makes so many new inventions possible and successful in America which are not so in England. A simple and well known case which negatives the *Times'* theory is that of the revolver. No one can say that the necessity which incubated pistols sat more heavily on America than on the older and military states of the world. Moreover, the revolver has been invented at least two centuries, and may be found in various forms in all the collections of mediæval arms in Europe. No English gunsmith who studied his business properly, should have been unacquainted with this old weapon. Only, it seems never to have been a success. The reason of its revival in America was simpler than the *Times'* theory: the quality of the workmanship employed on it was such that a perfection of adaptation of the mechanism which revolves the cylinder was possible, and the operation of it became automatic and infallible.

One can hardly say that a more dire need of telegraphic operation obtained in America than in England; in point of fact, an imperfect system of communicating by electricity was used in England before Morse turned his attention to it. Morse was driven by no necessity to use a telegraph—probably cared less for the actual benefit of the invention than any operator in cotton even at that day. But he saw the imperfection of the appliances, and invented the relay magnet which made the recording of an electric impulse possible. And to this day the majority of all improvements in telegraphing are invented in America. There is here no question of carrying labor where it is most wanted by mechanical appliances, for the greater need, if that can be called need which created its own demand, was on the other side of the Atlantic, to say nothing of the greater number of scientific investigators.

England had a large army and pretty constant occupation for it, somewhere, which did not prevent Englishmen and the English government from going on with the old system of making guns by hand, and clumsily, until from the American machine shops was turned out the mechanism which set Enfield going on a new basis. The Waltham watch works are another case in point. A large portion of the mechanical intelligence of England was employed in watch making, and it still is so, but the watch made by the Waltham workman, without any novelty in invention, is a better watch, at a given cost, than the English. When Whitworth came to America to study the American system of rifling small arms, he found no new principle applied or variation in the general design from English rifles, but he found a precision of workmanship which few men in England, besides himself, had the mechanical *finesse* to appreciate. The external differences were very trivial, and generally the English gun showed a luxury of mere finish which quite shamed the rough American gun; but I never knew an Adirondack hunter, in my hunting days, who would accept an English rifle as a gift on condition of habitually using it. Yet the English gun cost, on the average, five to ten times as much as the American, while, for practical result, it was not to be compared to it.

The difference in every case was in the fact that a higher grade of mechanical intelligence was employed by the American—a keener and finer perception of what fitted the case—a mental micrometer which discovered hundredths where the Englishman's only found units. This, of course, Englishmen in general will not admit, but it so happens that I have often had occasion to employ good English workmen in England, and I have invariably found that in the intelligence to apprehend fine degree of fittingness, precision of shaping, and especially capacity to catch a new idea, the Englishman was far inferior to the American. I remember a case in point, which I will relate in detail, as it is characteristic. In a journey from New York to London I had lost out of my valise a small swage for shaping and compressing the conical bullets for a hunting rifle I carried with me. It was a simple affair, a bit of steel bar bored into a couple of inches, and then at the bottom of this drill hole the conical reamer which shapes the shot is sunk its full depth. A plunger, driven down by a hammer, forms the base of the shot and compresses it. The whole cost, in New York, $2. To replace it I went to all the gunsmiths between Regent street and St. Paul's, but could not find one who would undertake it, until finally I was directed to a high class workman who had a small shop and worked for the larger manufacturers. I explained my want to the minutest operation, gave him a sample of the missile to work from, and at the end of three days, employed in failures, he brought me a curious affair made by turning out in a lathe the form of the shot in a kind of die, which was then tapped and screwed into a tube made of a piece of gun barrel of the requisite bore, to which was added the plunger. He had not in the least understood my description and drawing, and could not conceive any other way to make the thing than that he had employed. Of course it split at once under the pressure and had to be thrown away.

I am myself sometimes attacked by a mechanical idea, and now and then it results in an invention. It happened that one one occasion the product was a photographic camera obscura, which involved some mechanical principles new to this kind of work. I made an elaborate working drawing full size, with details of all new parts in separate drawings, and sent them to a camera maker who had the highest repute in London, but after some months they came back with a message that the arrangement was not practicable. I then went personally with the drawings to another workman, who was really the most ingenious in this branch I ever found in England, and even with him was obliged to make a wooden working model of the whole thing before I could make him see that it would work, and I had to watch the construction from beginning to end, intervening at every new step to keep it what I had planned.

At another time I had got from America a piece of apparatus which I wanted copied. An important part of it was a very light bronze bed plate, rather complicated for a casting, but in the American article done well and cheaply. The manufacturer to whom I took it looked at it in admiration and dismay. "I can't get casting like that done in this country," said he; "there is not a founder in London who can do it," and he was obliged to substitute sheets of brass screwed in place and supported by wood.

A still more convincing case has lately occurred in my experience. I have a Remington gun, to which I wanted some additions made, and sent it, being on the Continent, to the Remington establishment in London, where English operatives are employed. After the characteristic delays, which I never found wanting in English workshops, the gun came back to me with the desired alterations, but done in a clumsy and uninventive manner, which any ordinary American gunsmith would have been ashamed to send out of his workshop. Yet here was, or was supposed to be, the American intelligence presiding. I have had the same things done at home at half the cost, and in a manner which left no ground for comparison.

These are instances of what I have seen many times. The English workman in general is insensible to those nice degrees of excellence, neatness, and precision in the manipulation which the American workman catches so readily.

The success of American invention, in my opinion, is due to the highest excellence of the mechanical manipulations by which they are worked out—an excellence compared to which French work generally is flimsy and English clumsy—the former gives way, and the latter is not exact. I know Englishmen of extraordinary mechanical genius, but their most ingenious ideas are carried out at Paris.

But if the success of invention is due to the finer grain of the workman's brain, the invention itself is due to other qualities more multiplex and less easy of being demonstrated. First, I believe, is the freedom from deference to precedent which characterizes the American character in every branch of activity. This, of course, is due simply to position. We had no precedents, except such as it was impracticable to follow, and the habit of having none has liberated thought in every way. The contempt for authority, which in excess proves so often disastrous in our politics, is an almost unmitigated advantage in all mental processes except the purely artistic. The American in his better development gives that devotion to law which the Englishman gives the authority; but the law is universal in its application, while authority is narrow and restricted to what has been done. This distinction imbues the whole national character. The Yankee if menaced with arrest wants to see the warrant; the cockney accepts the mission of the "bobby" without any other demur than perhaps to look at his number.

But still behind these qualities lies the essential inventiveness—an intensity of imaginative vitality which is in the composition of the composite race which we are, the power which in art and poetry has held and will always hold the world in reverence, and which had such a glorious sunrise in Greece from Homer to Praxiteles, the power which no man can explain and no man can acquire, which seems to come to man or nature without antecedent or succession, and of which we know mainly that it generally goes in schools. There is a curious and close likeness between the character of the Greek and the American, which goes even into the type of the physique, and which I have heard often noted in Greece, both by Greeks and foreigners. This very element of imaginativeness is one of the strongest components in the similarity of the national characters. It will be curious for those who will be here to see it, to follow out the parallel which certainly does now exist and that which will obtain between the republican Greek of 700–500 A.C., and the republican Yankee who will exist about 2000 A.D.

So far as England is concerned there is a negative element which is disastrous for the development of invention in that country in the patent law system, perhaps the worst that exists in any state in Europe—worse, actually, than none at all.

I have had some personal experience with it, and feel justified in saying that I do not know which is worst, the scheme of law, the manner in which the patent officials do their duty, or the curious ignorance of all principles of mechanism shown by the judges who sit for the decision of patent cases. Neither the legislative nor the judicial authorities seem to be able to understand the interests, not of inventors merely, but of invention.

Labor Troubles Abroad.

The ship builders, mine owners, iron workers, and in fact nearly all the manufacturing industries of Great Britain, find it imperative to reduce the prices of labor in their various establishments. This produces an uneasy feeling throughout most of the manufacturing districts of England, and the American *Architect* thinks it looks as if the battle so portended were likely to be one of the severest of the labor war. However it may end, it can hardly be other than disastrous. The iron trades in Great Britain are now in an exceptionally critical condition, owing to the successful competition of other countries, particularly of the United States, and the coal trades necessarily suffer with them. If the men succeed in the struggle in either trade—or in both, for it is likely that they will succeed or fail together—they will succeed in adding a heavy load to an industry that already shows symptoms of paralysis. If they fail, they will still have done by forced stoppage an injury to their employers of which they must themselves feel the burden; hut they will waste a great part of their own strength in the conflict, for they will probably not give up early. The funds which they have laid up for the relief of the disabled among them, or of the families of those who die, will be eaten up very fast, and in spite of this the hardships which it was their purpose to avoid will have been increased. It might have been hoped that the fortune of the Oldham strikers, who, having in a few weeks spent more than a quarter of a million dollars in the effort to force their employers to pay them wages which the condition of business would not allow, found themselves obliged to yield, would have made other unions slow to follow their example. But there is not much hope of avoiding the waste and injury of strikes so long as working men are taught or allowed to look upon every diminution of wages as an oppression. Their greatest benefactor just now would be he who should teach them that no class in a community can expect to be exempt from the suffering and loss of a period of general adversity, and that to strive against such loss with violence is to kick against the pricks; and should moreover lead them to look for comfort in the doctrine that even a fall of wages does not necessarily mean a loss of comfort when the cost of living goes down with them.

American Reapers and Binders in New Zealand.

From the New Zealand *Country Journal*, a monthly publication devoted to agriculture, pastoral, and horticultural pursuits of New Zealand, we learn that our reapers and binders are finding their way into that far away colony. At present, so far as we are aware, says the *Country Journal*, there are six different self binders in the American markets, viz., the McCormick, Wood, Osborne, Marsh, St. Paul, and Buckeye, each claiming superiority over its fellows. With regard to the merits of the several machines as yet imported, it is not the province of this paper to express any opinion in favor of any of them. The farmers of the country must be the judges; time only can decide which is really the best, although there is no reason why one may not be quite as good as another. So far, those in use have their several admirers, and doubtless each has its own peculiar merits. As yet the trials have not been sufficiently varied or numerous to justify any fixed opinion of any value, which would laud one maker's machine over the others. As we have just remarked, time and the farmers themselves will decide. At the conclusion of next harvest the country will be in a better position to judge. The only objection, adds the writer, and the same we believe prevails here, which we have heard raised against these machines is, that the wire cannot be kept out of the straw, and that it will prove detrimental to horses and cattle, when cut up with the chaff.

What Civilization and Invention Do.

One of our daily newspapers said the other day, just after recounting a series of disasters, that there seems a fatal quality belonging to every one of civilization's conveniences, inventions, and improvements. The aboriginal Manhattan was safe if not always comfortable in his wigwam. Our houses serve as man traps, burning or crushing out scores and hundreds of lives annually. Our elevators fall and kill their inmates. Steam boilers in the next building, of whose existence we are not aware, suddenly explode, mangling and scalding people not previously aware of their existence. The locomotive averages over a victim a day "killed on the track." Gas leaks accumulate and explode, smashing people and furniture. Drawbridges lure people to tumble into the water and drown. New chemicals used in manufactures explode with terrific force, and nobody is left alive to tell what it was or how it ignited. Even fine flour siftings and pulverized starch are regarded as suspicious characters full charged with explosive and deadly intent. Ice making in range and water pipes converts them into engines of destruction. Though sewers carry off filth, they also extract its deadliest essence and send it back into our houses as "sewer gas." Civilization is full of peril. The original Manhattanese had not to incur these daily risks of our lives.

COATING COPPER PLATES WITH IRON.—Prof. Böttger recommends the following solution for coating copper plates with iron: Ten parts of ferrocyanide of potassium and twenty parts of tartrate of soda are dissolved in 220 parts of distilled water, adding a solution of three parts of sulphate of iron in fifty parts of water. Caustic soda solution is poured into the mixture until the Prussian blue formed is redissolved.