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OUR NATIONAL DEFENSES.

All the harbors of our large cities are skirted round by forts which, in the present improved state of ordnance and by the adoption of iron-clads, are rendered of very little use. This is saying a great deal, but the statement can be substantiated by facts. It is fresh in the minds of all persons that our iron-clads have repeatedly run the batteries at Vicksburgh, and that our fleet of wooden ships passed up to New Orleans in spite of Forts Philip and Jackson; disregarding the storm of iron that these works belched forth, they boldly and successfully dared the passage. They accomplished their purpose and obtained the surrender of the city by appearing before it with open ports and guns yawning from them. Such has been the experience at that point, and other cases, might be cited in proof of the assertion that ordinary forts are not only incapable of arresting the passage of an enemy's vessel or fleet, but that they themselves are very far from being any protection to the forces within. Fort Pulaski is an example in point; although this work was not by any means a modern fortress, one built of heavy granite; yet before the present war it was thought sufficient to defend the point on which it was erected.

With the rapid strides that our inventors have made, and are making, as well also those improvements which have been inaugurated in foreign countries, we may well question whether the forts now guarding the principal ports of the country are of any particular value. If at some future day an inimical armored ship-of-the-line should steam deliberately past our forts in the Narrows, or else maneuvering at a safe distance, riddle them with rifle shot and shell, we should mourn and deplore our folly and inefficiency when too late. What guarantee have we that such proceedings may not take place, or what assurances that the smooth and plausible proffers of friendship, amity, and neutrality are not so many schemes that our foreign foes employ to lull us into fancied security, until their preparations are completed? Already threatening murmurs arise in diplomatic circles; interests clash, and ministers with subtle phrases strive only to evade the truth. Dissatisfaction with England—at her course in fitting out privateers to prey upon our commerce—is rife among the influential classes; and who shall say that complications may not arise wherein the whole and sole dependence for liberty and property will fall upon our ability to maintain them at the mouth of the cannon? We have an iron-clad navy building which—sneer at it as they may—our enemies will find to their cost, should they inaugurate a war by interference, is amply able to defend us on the high seas; but can we rely upon those stationary structures, which, although efficient at one time, have been left stranded on the shore by the great wave of improvement now sweeping over the whole art of modern warfare?

The means to defend every port on the coast or inland seas are not wanting. Many schemes have been projected, none adopted; some of those plans were utterly useless; many more were in the highest degree practical and praiseworthy. Of the latter class is that system of national defense proposed by Timby, the inventor of revolving turrets. If ships can run by forts with impunity, the inference is that, if guns cannot prevent them from so doing, some other agent must; these means are found in obstructing the channels in such a manner that, though free ingress and egress can be had to peaceful ships, the entrance can be completely closed against those striving to enter unlawfully. These features are all provided for in the system mentioned, and the details of the plan are full of excellent features.

In addition to the plans just mentioned, there are others all practicable and eminently feasible. Mr. Reed of this city proposes a system of iron forts constructed of cast-iron blocks locked and jointed together by a peculiar arrangement of the component masses. Without criticizing his method of erecting such forts, it is apparent that a stubborn defense against siege or assault can be made by forts made impregnable by iron mail, when located so as to command the channel, as in Wiard's plans. When shall we assume the iniative, and lead off in improvement; instead of following timidly in the wake of other nations in experimenting on the best means of national defenses? Americans have a great reputation for individual enterprise and energetic adoption of any method or means that promises to pay for its introduction; yet, when it is left to the Government to decide what is best in certain circumstances, timidity, hesitation, and uncertainty characterises every movement. Other nations deemed it wise to provide an iron navy; but we, with that mysterious foresight which distinguishes the administration of our naval affairs, decided that they were of no use, until one fine day a rebel ram came down and sunk our prejudices and our wooden ships together! Fort McAllister resists bombardment from the heaviest shells and shot that were ever thrown, and we are told that the fort is iron-clad; this statement we do not believe, but it is a notorious fact that in all novel means of national defense, the despised rebels have been—solely through our own remissness—the first to introduce them and give them a practical trial. How long shall such a state of things as this continue? When shall we have a system of national defense commensurate with our standing as a people and our skill as inventors?

THE PROPOSITION TO INTRODUCE A STATE PATENT SYSTEM.

Several correspondents have written to us respecting the proposed State patent system which we briefiy discussed on page 234, current volume of the SCIENTIFIC AMERICAN. Without going over the ground of this discusion again, we will present one or two points in the matter which seem to us not only pertinent but quite fatal to the proposed scheme.

The Constitution provides that Congress may enact laws for the protection of inventors and authors for a limited period. In pursuance of this provision a patent law has been enacted which limits the grant of Letters Patent to the *original* and *first inventor* of any new or useful improvement. This law is alike binding upon all the States; and on the trial of patent causes, the sole jurisdiction respecting their validity, &c., rests with the United States courts. It is proposed in the Massachusetts patent bill to grant Letters Patent to an *introducer* of another man's invention, or the introducer may also be the inventor of that for which he seeks a patent; for certainly it is not intended by this bill to withhold a patent simply because the applicant may happen to be the inventor. Now it is our opinion that this system will interfere in two ways with the Federal statutes. In the first place, if the proposed State patent law allows a patent to an *inventor* for a new and usefulimprovement, under any circumstances, it usurps the power delegated solely to Congress for that express purpose by the Constitution. In the next place, if the system allows a patent to the mere *introducer* of an invention made by another, it practically nullifies the Federal law, which expressly declares that no one, except the original and first inventor, shall be entitled to Letters Patent. We insist that no State has a right to enact laws which so directly fiy in the face of the laws of Congress, and we say furthermore that a State patent granted to an introducer could not be maintained against an infringer on a question of law. The moment an appeal should be taken from the decision of the State courts to the Federal courts, that moment the illegality of the whole matter would be made clear to the most skeptical.

The patent laws of the United States are considered ample to protect the rights of all original inventors; and to introduce State action in this matter would open the door to expensive litigation and confusion. Besides we do not like that spirit which goes hunting through the Constitution for vague reservations in favor of States; and upon which attempts are made to build up systems of doubtful value and in seeming antagonism to the supreme law of the land. If the interests of Massachusetts are not sufficiently well protected by the existing patent law, we will cordially advocate all needed changes when pointed out to us; but this attempt to foist upon its people an independent system we consider very injudicious as well as illegal.

DEFECTIVE WROUGHT-IRON.

It has been noticed that most of the axles of the railway cars which have broken down while running have exhibited a crystalline fracture; parts of iron bridges which have suddenly snapped have also shown the same characteristics, and, from such evidence, it had been concluded that wrought-iron in car axles and bridges, when subjected to vibrations from continued use, changed its character and became as weak and unreliable as cast-iron for such purposes. No attempt had been made, so far as we know, to solve the problem how vibrations could produce such a change in the molecular arrangement of iron, but it was very generally believed that such a change did take place. This question deserves more general attention than it has received.

The fact is unquestioned that many broken wrought-iron axles, stay-rods of bridges, &c., have exhibited a crystalline fracture resembling that of cast-iron; but good evidence goes to prove that such defects in iron are due to imperfect treatment of the metal in its manufacture, not to vibrations in the structures to which it has been applied. This alters the case completely, because a remedy for this evil may be provided, whereas the belief in vibrations being the only cause of it, not only misdirected but perverted the public mind.

In a set of very carefully-conducted experiments to test the strength of bars of iron and steel, it was demonstrated that any bar of fibrous iron exhibited a crystalline or a fibrous fracture, according as it was broken suddenly or gradually by the strain to which it was subjected, thus affording evidence that vibrations had nothing to do with the result. One great cause of defective wrought-iron—that which exhibits a cast-iron fracture when broken—may be traced to imperfect modes of manufacture. Bar and plate iron are now made more rapidly than formerly. The metal, in a semi-fluid state, is passed from the puddling furnace through a succession of rollers without reheating or faggoting, and is at once reduced to the sizes of bars required. Very imperfect bars must occasionally be produced by this mode of operation, as parts of the metal are sometimes only partially converted into a malleable state. Many axles and rods made from iron bars thus manufactured must be defective and exhibit a fracture like that of cast-iron.

It is well known that the plates of exploded steam boilers have usually shown a crystalline fracture. The metal may have been defective from the very moment it came from the rolling mill. All iron and steel intended for axles of cars, bridges, boilers, ships or any structure upon which the safety of life and property are dependent in traveling by railroad, or otherwise, should be fully tested to ascertain its real nature, so that there should be no doubt about its safety before it is applied. We believe that there are thousands of tuns of bar and plate iron now applied to engineering structures which are unfit for such purposes.

THE PROPOSED CANAL ENLARGEMENTS.

It would appear from reliable data that the recent political manifestation in the Northwest had some other origin than the efforts of disaffected persons to create dissension between the citizens of that section and the manufacturing interests of the East. The difficulty seems to arise more particularly from the delay and expense which occur in getting the great grain crop of the West to market at remunerative prices to the producer. In 1838 the total quantity