THE NEW TARIFF—DEVELOPMENT OF OUR IRON INTEREST—A FIELD FOR INVENTORS.

The old struggle between Protectionists and free traders—Whigs and Democrats—will probably never be revived. The world has settled down into an active or implied acquiescence in the liberal policy involved in free trade principles; and since their adoption in 1846 we have progressed in general wealth in a ratio sufficiently great to satisfy the ambition of the majority of mankind. What, however, the whigs strived to obtain on principle the war has now necessitated in fact. In order to meet the wants of the government exchequer the tariff of March 2, 1861, imposed a specific duty about equal to that imposed in 1842. The Whig party, then in power, in order to give effect to its principles, established a specific tariff, and imposed upon iron imported in the form of bars or bolts a duty of $17 per tun; upon iron in pigs, a duty of $9 per tun; upon old scrap iron a duty of $10 per tun; and upon steel a duty of fifteen cents per 100 pounds. The act imposing these duties was, however, subsequently amended by the act passed on the 30th of July, 1846; this act imposed, instead of a specific duty, an *ad valorem* duty of 30 per cent upon iron bars, blooms, bolts, hoops, pigs, rods, slabs, &c.

Protectionists and free traders agree that changes in the rates of imports are disastrous, and the steady policy rendered necessary by the large amount of revenue to be raised hereafter by the government will have no small tendency to lighten the burden of these taxes. If the government is maintained and the community can have assurance that our legislation will not be fluctuating we shall certainly very soon produce our own iron and steel.

Whatever natural obstacles it may be necessary to overcome they will all disappear under the repeated efforts of industrious mechanics, aided by the skill and ingenuity of inventors. With the best iron and coal in the world lying in enormous quantities beneath our soil, and strong hearts and laboring hands above it, the question of our ultimate ability to mine and enter it successfully into competition with the foreign metal, is only one of time. This prophecy is fully justified by the history of the iron manufactories in the United States during the last fifteen years. Notwithstanding the blow experienced by them at the reduction of the tariff in 1846, we find that in 1859 there were, within the United States, in working order, 1,159 mills, of which 560 were furnaces, 389 were forges, and 210 were rolling mills; there were 386 mills abandoned, of which 272 were furnaces, 99 were forges, and 15 were rolling mills. The total production of pig iron in the United States in 1854 was 724,833 tuns, in 1855 it was 728,973, and in 1857 it amounted to 812,917 tuns. The crisis of 1856 acted injuriously upon the production of the material; this branch of industry suffering with other branches.

The amount of rails manufactured in the United States for several years previous to 1857, compared with the amount of rails imported, show a gradual increase of the amount made here with a decrease in the amount imported, until the amount made and imported in 1856 about equal each other. The following is a table of years from 1853 to 1856 :—

	Made.	*Imported.*	*Total.*
1853	105,000	298,995	403,995
1854	121,000	282,867	403,867
1855	134,000	127,516	261,516
1856	142,555	155,496	298,051

Thus it is apparent that the domestic manufacture of rail has increased, under and notwithstanding a comparatively adverse tariff. And with no revulsions in trade, we could reasonably expect in a few years to produce all the iron needed for home consumption.

But manufacturers have now a new incentive to enlarge their amount of production. The present tariff, as we have before said, is about equal to that of 1842; and for ten or twenty years it will probably remain the same. The war has necessitated an expenditure which will effectually prevent any reduction of the present tariff, and capitalists, therefore, need have no apprehension of a reënactment of the old tragedy. Notwithstanding the war, our railroads and transportation companies have been doing a heavy business. They were careful at first not to incur unnecessary expenses, but their unexpected good business has worn their rolling stock more than usual, and now necessitates active operation in repairing and reinstating them in their former good condition. In the last five years 9,729 miles of railroad have been laid, and this in spite of the crisis of 1856. We certainly may count on some increase in the future, notwithstanding our difficulties. The value of iron imported in the year 1859 was $21,526,574; and in no better way can the expenses of the present war be paid, than in a channel which will certainly result in developing to a yet unprecedented extent our own productions of native American iron.

This, too, opens a grand field for inventors. Scarcely an invention is patented but what is either connected with iron machinery or has iron as a part of its composition. The extent, therefore, of the development of American iron, and the multiplicity of purposes to which it is applied, increases the opportunities which shrewd inventors are always ready to perceive and turn to account. The article iron has already entered into innumerable services of life, and it is now as much a necessity to civilization as the air we breath is to our existence. We dig it from beneath our feet and it becomes implements that elevate us in the scale of being, which impart to us knowledge and furnishes the means to supply our physical necessities. We prophesy a new era in the development of American iron, unequaled in past time, and by no means conceivable at present.

Superheating Steam.

The engineer of the British Association for the Prevention of boiler explosions, reports as follows regarding superheating :—

In my last report I called attention to the application of steam jackets to cylinders, pointing out their importance as an agent "for effecting economy in the use of steam." I now wish to allude to a kindred and equally important subject, namely, that of superheating, the economy derived from which has now become established by general experience, and in marine engines has, in many cases, effected as high a saving as thirty per cent. I scarcely anticipate such a result as this from its application to Lancashire mill engines; still I am confident that a very considerable saving would be effected, while, at the same time, the vacuum would be improved, the temperature in the hot wells reduced, and less injection water required, which, to steam users having cooling ponds of limited area, would be most important. These results are mainly due to the prevention of condensation and re-evaporation on the internal surface of the cylinder, as explained in my last report relative to the action of the steam jacket; so that the effect of superheating the steam, or coating the cylinder with a steam jacket, is very similar. The application of the jacket, however, to cylinders can only be made at the time of construction, except with considerable difficulty, while the principle of superheating can be applied to old engines as an auxiliary without alteration to the existing arrangements. The subject of superheating has been sadly bugbeared. It has been reported that the use of superheated steam would destroy the surface of the cylinder, piston, and slides, by preventing lubrication; also that it would corrode the metal; that it was highly explosive, productive of great pressure, and altogether dangerous and difficult to deal with. Actual experience, however, has proved that these objections are entirely visionary, and I have only within the last few days been assured by the superintending engineer of all the engines and boilers in the large fleet of the Peninsular and Oriental Steam Navigation Company, where superheated steam is now and has for some time past been extensively employed, that no difficulty is experienced in its use, and no alteration whatever is required in the old engines beyond the introduction of a slightly better description of packing for the glands, while not a trace of corrosion has been found. It only now remains, therefore, for the manufacturing engineers of this district to bring out a simple and efficient superheating apparatus, adapted to mill engine boilers, by which they will not only benefit themselves, but at the same time render essential service to the steam users of the district. I am glad to say that one of our members is now laying down a superheating apparatus, and, as soon as I have an opportunity of doing so, I shall be happy to state to the members of the association the results of its actual working as applied to the boilers of an ordinary mill engine, and to assist in the general introduction of this system amongst all our members by affording any other information I am able. I would state, however, in the mean time, that it is found most advantageous to superheat the steam to about 100 degrees above the temperature of plain steam, when no difficulty is found in lubricating; also that the utmost care must be taken in maintaining the temperature of the steam when once it has been superheated, or the virtue will be lost before it gets to the engine. I found in one case that although the temperature immediately on leaving the superheater was as high as 600 degrees, yet it had fallen nearly to 300 degrees on its arrival at the engine. I understand that some parties entertain the idea that superheating may be advantageously applied where steam is used for heating purposes. I am convinced, however, that such would not be the case, and that disappointment will inevitably ensue wherever superheating is adopted with this view.

Marine Engine Improvement.

It is our belief that one of the most important steps yet to be taken in the path of improvement is that of increasing the working speed of our engines. We are working 7 feet pistons at 300 feet per minute, where we ought to be running 5 feet pistons at 600 feet. The saving in dead weight would of itself be very great, it being understood that the high speed engines were accurately counterweighed, and, moreover, steam can be worked with more economy where there is little time for cooling in the cylinder. To work at a high speed, we should either require to have a long stroke, which, in the case of screw engines, would seldom be admissible, or we should else be compelled to resort to gearing—reversing the usual practice with geared engines, of getting up the speed from a slow-moving piston, by bringing down the speed of an engine making 100 revolutions or so per minute to a propeller shaft working at forty or fifty turns in the same time. If we were to judge by the general practice of marine engineers in "gearing up," we might conclude that spur wheels are not at all objectionable on board a steam vessel, and we should no doubt have them in war vessels were it not that the great spur wheels reach above the water line. In gearing down the speed, however, this would not be the case, as the large wheel need hardly exceed one-third the diameter of the propeller. The pinion or "jack wheel" would be placed to one side, instead of at the top or bottom of the main wheel, and thus, by carrying the crank shaft to one side of the keel of the ship, room would be afforded for a good length of connecting rod, which, in many cases, is now less than twice that of the stroke. Or the pinion could be placed at or near the bottom of the main spur wheel, and thus lower the foundations of the engines, which, in ships with flat or nearly flat floors, is in itself an important matter, and one by which, in many cases, room would be afforded for an additional deck over the engines.—*London Engineer.*

Feeding Domestic Animals.

In Germany, cattle and horses are fed five times each day, and of course a smaller quantity at each meal. Here we feed three times per day. Which plan is right? Do cattle in the wild state feed but three times a day, or do even our domestic cattle educated to three meals per day, adhere to the custom when permitted to range in rich pastures? Or do they eat smaller quantities and more frequently? Are either the habits of the wild cattle or the domesticated, to be taken as pertinent example of the more judicious course to be pursued? Cases may occur where the present custom is most convenient, such as the feeding of working cattle while their drivers are at their meals; but should this apply to fatting cattle, milch cows, or cattle not in use?

A Question in Natural Philosophy.—We very frequently receive letters from correspondents who think that they have discovered a fallacy in the philosophy or an error in the received facts of science. These letters generally show that the writers simply did not understand the subjects that they write about. Indeed we have never received a communication of this character that had any force in it with the single exception of the article that will be found on another page, entitled, "Gravity and the Pendulum." To it we invite the attention of all who are interested in astronomy or natural philosophy.

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