Correspondence.

The Wrongs of American Inventors.

To the Editor of the Scientific American :

I would respectfully direct your attention to the flagrant wrong done American inventors by foreign governments, in that any person can patent in those countries inventions of Americans, while our government protects these foreign inventors by refusing to grant a patent, only to the inventor himself.

Oftentimes the American inventor is poor, perhaps has spent years of time and all he could snatch from his daily pittance to get his American patent, and is too poor to patent at once his invention in foreign countries. The unscrupulous capitalist here or abroad, like a bird of prey, stands ready to seize the opportunity and reaps vast benefits, while the American receives nothing for his life-long efforts.

Every American inventor is bound by principles of self-protection to insist and demand that Congress shall right this matter and put the American on the same footing as the foreign inventor, and refuse to grant patents to foreign inventors until foreign governments shall by legal enactment destroy the custom of importing American inventions and despoiling poor American inventors. Let something be done in this matter to adjust this unfairness against the American.

GEORGE H. ENNIS.

Troy, N. Y., May, 1881.

[We think that if our correspondent will study the subject a little further he may reach a different conclusion: 1. In nearly all foreign countries the patent is granted only to the inventor—England is the chief exception. 2. With a little perseverance any inventor, even if poor, who holds a really good invention, can find partners who will be glad to pay the expenses of obtaining foreign patents. 3. We wish our correspondent would mention individually some of the unscrupulous capitalists he refers to. That many American inventions are manufactured abroad is true. But in general, where the inventor fails to share in the benefits, it is because he did not wish to take any steps to do so, but voluntarily abandoned the field to others. 4. The American inventor stands on the same footing as other inventors in nearly all countries where patents are granted. There is no unfairness, and the custom of "despoiling poor American inventors" is imaginary on the part of our correspondent.—EDS.]

The Tables of Regnault and Rankine.

To the Editor of the Scientific American :

On page 228 of the current volume of the SCIENTIFIC AMERICAN, in a brief memorandum referring to the last session of the American Society of Mechanical Engineers at Hartford, I am reported as stating that the tables of Regnault and of Rankine are not exact "under all conditions." The statement as printed does not at all convey the idea which it was intended to present.

My statement was in effect that Regnault's tables were the result of empirical (*i. e.*, experimental) work; that exactness was secured by extraordinary precaution in experiment and by graphically representing results, thus securing a correct statement of the law of variation of pressures with temperatures, and that formulas were then fitted to the case, which formulas very accurately represent that law. I further remarked than Rankine's formula so accurately states the law that its errors lie within the limits of the most exact observation.

I am correctly reported as endeavoring to impress upon engineers the importance of making their practice "depend upon observations derived from the actual conditions of the special cases in hand," as the SCIENTIFIC AMERICAN puts it.

R. H. THURSTON.

Hoboken, N. J., May 20, 1881.

Comet A 1881.

To the Editor of the Scientific American :

In the current issue of your valuable paper an article upon Swift's latest comet implies that no one else had seen the same, so far as known, but the discoverer. Permit me to say that I had the pleasure of securing two good observations of it on the mornings of May 3d and 4th (it being discovered on the morning of May 1st), and which at the time were the first observations reported to the discoverer, as he informed me, from other astronomers. Prof. Chandler, then at Portland, Maine, also secured observations of it and immediately issued an ephemeris. It was seen at the Harvard College Observatory, also at Dun Echt, Scotland. Yesterday I received from the president of the Boston Scientific Society observations and elements of the comet, made by M. Eugen Block, of the Observatory of Odessa, Russia.

Its position at discovery was 0 hour 0 minute R. A., 37° north declination. When first seen by me it was about 2° southeast of that point, which shows its direction and rate of motion. It is now invisible, but may become visible again upon the other side of the sun.

WILLIAM R. BROOKS.

Red House Observatory,
Phelps, N. Y., June 7, 1881.

DETAILS of the destruction of the British gun boat Doterl in the Straits of Magellan show that the condensing boiler exploded, and that the shock exploded a quantity of gun cotton stored in the forward magazine.

MECHANICAL INVENTIONS.

Mr. John D. Smith, of Fayetteville, N. C., has patented a screw for a carpenter's bench vise, which consists of a cylindrical wooden body and a metal rod coiled spirally around it and partly embedded in its surface.

An improved spring power motor for working sewing and other small machines has been patented by Mr. Truman H. Baldwin, of Baraboo, Wis. This motor attachment is adapted for imparting about twenty thousand revolutions at each winding to the shaft on which the balance wheel is mounted, and the inventor claims the winding may be effected with comparative ease by means of the lever. The motor is compact in form, and may be quickly attached to or detached from the sewing machine.

An improvement in water wheels, patented by Mr. Thomas B. Van Pelt, of Carterville, Mo., consists in the peculiar construction of two or more water wheels mounted on the same horizontal shaft, and revolving in a flume provided with stationary counter buckets or inclined plates secured to the inner face of the cylindrical flume between the buckets, and guiding the water, after having acted on a water wheel, to the next.

Mr. Alonzo J. Simmons, of Raysville, Ind., has patented an attachment for furnace doors, which consists in the combination of a perforated steam pipe arranged within the furnace near the door opening and connected with the steam space of the boiler, and a valve to regulate the admission of steam to the perforated portion of the steam pipe, the steam pipe being arranged to direct a sheet of steam across the furnace door opening to prevent the cooling of the furnace by the entrance of cold air.

Cost of Public Buildings.

An experienced architect and surveyor, on the 19th of February, 1879, prepared and presented to General Meigs, Quartermaster-General, the estimate which follows of the cost of varions public and private buildings in this country, the comparison being by cubic feet, external dimensions:

Buildings.	Cubic Feet.	Total Cost.	Cost per Cubic Foot. Cents.
Snb-Treasury and Post Office, Boston, Mass.	2,671,338	$2,080,507	77.88
United States Branch Mint, San Francisco, Cal	1,680,795	1,500,000	89 24
Custom and Court House and Post Office, Cairo, Ill	444,376	271,081	61.00
Custom and Court House and Post Office, Columbia, S.C.	587,916	381,900	64.95
United States Building, Des Moines, Iowa	413,987	221,437	53.48
United States Building, Knoxville, Tenn	542,362	398,847	73.53
United States Building, Madison, Wis	541,483	329 389	60.83
United States Building, Ogdensburg, N. Y	447,585	216,576	48 38
United States Building, Omaha, Neb	654,703	334,000	51.01
United States Building, Portland, Me	524,886	392,215	14.72
German Bank, 14th street, Newport, R. I.	600,000	475,000	79 1-6
Staats Zeitung, New York City	508,000	475,100	93 52
Western Union Telegraph, New York City	1,330,000	1,400,000	105.22
Masonic Temple, New York City	1,800,000	1,900,000	105.55
Centennial Building, Shepherd's, cor. 12th and Pa. ave., Washington, D. C.	931,728	246,073	26.41
Add to this the United States National Museum, Fireproof Building at Washington, D. C.	3,843,611	250,000	6½

Fireless Locomotives.

Improvements in detail have been made by M. Leon Francq, who lately read a paper on the subject before the French Association for the Advancement of Science, from which we glean the following particulars: The locomotive is provided with a tank containing water at a sufficiently high temperature (203° Cent., equal to 397° Fahr.) to produce the necessary quantity of steam for the journey. The water is heated at the starting point by means of a jet of steam at high pressure produced by a stationary boiler. As the boiling point increases with the pressure, it follows that, in a closed vessel, the greater the heat the higher the pressure attained. If the heating be effected by a jet of steam, as in the present case, the steam fills the space above the surface of the water, at the same time increasing the pressure. To apply this principle it is sufficient that the tank stand a pressure of from two to fifteen atmospheres (30 to 225 pounds per square inch). The steam from the stationary boiler fills three parts of the receiver and agitates the water sufficiently to distribute the heat uniformly. When an equilibrium of pressure between the boiler and the receiver is attained the cocks are turned off. The locomotive is then in running order, ebullition taking place directly communication is opened between the tank and the cylinders.

In practice the initial temperature may attain 200° Cent. (392° Fahr.), which corresponds to fifteen atmospheres or 225 pounds per square inch. The final pressure must be sufficient to take the train up the steepest gradient to be encountered. The tank or receiver is made of steel plates, and may contain over 1,800 liters (396 gallons). After leaving the receiver the steam passes into an intermediate chamber, which allows the steam to expand so as to enter the cylinders at a uniform pressure, independent of that in the tank or receiver. The exhaust steam is not utilized as in the ordinary locomotive, because there is no fire to urge, but escapes into an air condenser which is a closed cylindrical vessel traversed by more than 600 tubes open at both ends. The water of condensation passes into a tank, whence it is afterward withdrawn as feed water. The diameter of the cylinders is 23 centimeters (9 inches), and the length of stroke 25 centimeters (9⅞ inches), the working parts not differing from those of ordinary engines. The weight of the engine running light is 6¾ tons; and the tractive power is from 343 kilos (6¾ cwt.) to 1,031 kilos (1 ton), according to the pressure. In the event of an unusual resistance being encountered on the road it is sufficient to act, by a rod and lever, on the intermediate or equalizing chamber, so as to give a temporary increase of pressure on the pistons. At a speed of 12 kilometers (7½ miles) an hour, the wheels, which are 75 centimeters (1 foot 5½ inches) in diameter, make 86 revolutions a minute. With a stationary boiler of about 50 square meters (538 square feet) of heating surface, a working pressure may be maintained in the locomotive for seventeen or eighteen minutes. The consumption of fuel is found by experiment to be less for a given duty than is the case of ordinary locomotives. In a line of 10 kilometers (over 6 miles), the working expenses, including repairs and depreciation of stock, amounted to 45½ centimes per kilometer—say 7d. a mile run.

Nitric Acid.

This is one of the most important chemical agencies employed in the arts and manufacturing; agencies dne to the property which it possesses of yielding very freely a notable proportion of its oxygen to substances having an affinity for the same, a property which renders it one of the most energetic of oxidizing agents. On this account, as well as because of its cheapness, its use for oxidizing purposes in the laboratory is very extensive.

Its property of energetically dissolving many of the common metals renders it useful in etching steel, copper, bronze, and the like. In the manufacture of sulphuric acid, it is introduced for the purpose of effecting the oxidation of the sulphurous acid given off in the burning of sulphur, or roasting of pyrites, to sulphuric acid. It has the property of yielding, with certain organic substances, what are called nitro-compounds, which are of great value in the arts. So, for example, nitro cellulose (gun cotton), nitro-glycerine, nitro-benzole, nitro-mannite, and a number of analogous products are found. Owing to its powerful oxidizing action, it acts powerfully upon coloring matters, and on this account has some important applications in dyeing. By prolonged treatment with nitric acid, starch, cellulose (wood fiber), and sugar, are converted into oxalic acid; very dilute acid converts starch into dextrine. The fact that it will not attack gold, while energetically dissolving nearly all the other metals, has long been taken advantage of in the arts, in assaying and metallurgy, to separate gold from silver and base metals.

Nitric acid is employed in the chemical industries in great quantities in the mannfacture of an immense number of chemical products, in addition to those we have already named. Of these, some of the more important are: the preparation of picric acid from carbolic acid, naphthaline yellow from naphthaline; the manufacture of nitro-benzole, nitro-toluol, and phthalic acid; the preparation of nitrate of silver (lunar caustic), arsenic acid, fulminate of mercury, and, generally speaking, of the salts known as nitrates.

This acid is now manufactured chiefly from the nitrate of soda brought in great quantities from Chili and Peru, and is effected by decomposing this salt by sulphuric acid.—*Mining Journal.*

Spontaneous Combustion by Nitric Acid.

In consequence of the burning of a freight car during the fall of 1879, on one of the railways in Baden, which was suspected to have been caused by nitric acid, Professor R. Haas of Carlsruhe, was called upon by the government to report whether that acid could produce combustion or not. In the experiments made to solve this question the conditions which might be supposed to exist in freight cars containing nitric acid were imitated as far as possible. Small boxes of a capacity of 10 to 16 quarts were charged with variable proportions of hay, straw, tow, and blotting paper—all of which substances are used in packing—and placed within larger boxes, while the space between them was filled with hay or tow, to prevent too rapid a radiation of heat, because the experiments were to be conducted in the open air, and the outer box at the same time represented the walls of a railway car. The material contained in the inner box was now saturated with acid, and rather tightly compressed, so that when the cover was put on it was pretty well filled. At first reddish and afterwards whitish vapors were given off, finally a distinct smoke. On lifting the cover strongly glowing patches could be seen, which rapidly increased all through the contents, and which broke out in bright flames on access of free air or gentle fanning.

With red fuming acid, or with acid of specific gravity 1·48, these results were obtained very rapidly and within a few minutes. With ordinary acid, of specific gravity 1·395, it required somewhat more time, and the action was less energetic in the beginning; but, in three different trials, after about twenty minutes the same result was finally obtained, provided the material was packed tightly in the box and was thoroughly saturated in its successive layers.

It seems quite probable that even a weaker acid can produce the same result in larger bulk and during warm weather in a confined space which prevents rapid cooling. Hitherto it has often been doubted that spontaneous combustion could be caused under such circumstances, but the above experiments and results are certainly incontrovertible.