Our Editorial Correspondence.

WASHINGTON, April 10, 1861.

I alluded in my last letter to the examination of persons who are appointed to places in the Patent Office. This is required by a law of Congress passed in 1853, which provides for a proper classification and examination of the clerical force employed in the several departments. There are four grades of salaries established by this act, viz. : $1,200, $1,400, $1,600 and $1,800.

This examination is conducted with reference to the duties which are to be required of the appointee. Inwardly chuckling over his successful experiment in office-seeking, the candidate is summoned to appear before the examining tribunal; he begins to realize that Jordan may possibly be "a hard road to travel," and sets about to summon from every corner of his cranium, all those special qualifications which his friends recommended him to possess, for now his mettle is to be tested. The Examining Board,

"Whose visages do cream and mantle like a standing pool,
With purpose to be dressed in an opinion of wisdom, gravity, profound conceit,"

proceed to a sort of intellectual tilt with the subject. He must fight his way to the spoils in reserve for him, for it is evident that he is to be handled without mittens.

He is questioned as to his knowledge of the mother tongue—whether he can spell, read, write and compose correctly. The examination in Lindley Murray being completed, he may be expected to tell what he thinks about the reinforcement of Fort Sumter, and to answer all such questions in military science as may be put to him touching the feasibility of that scheme, and as to whether he would shoot from the right or from the left shoulder. He may then be examined in the higher branches of mathematics; one sample question will suffice. "Suppose corn is worth 65 cents per bushel, and you feed a hog three times a day for three months, and sell your pork for $7 per cwt., how much do you gain by the operation?" Then geography, topography and hydrography, including Maury's wind and current charts, philosophy and law. If the candidate shows proficiency in these learned sciences, he is supposed to be qualified without special reference to the soundness of his theological views. Fearing a little want of *sharpness* in the candidate, he is asked how he would proceed to survey the Patent Office? Discovering what he regards as a sort of *gum game* in this proceeding, he replies, "I would hire a surveyor to do it!" Lest it might appear as though I am disposed to make light of so grave a subject, I will state that one of the candidates informed me that the two questions I have quoted were actually put to him on his trial. It is reported that one candidate ran aground on the question: if he knew how to manage a certain kind of printing press? It is evidently in the power of this Board to put an extinguisher on the ambition of many youths who seek office.

The new law authorizes the Commissioner to cause to be printed ten copies of the specifications and drawings of each patent. A contract for this work has already been made with Gideon & Co., of this city. The specifications are to be printed in royal octavo pamphlet form, something after the style of the English patents. The drawings are to be traced on linen and attached to the printed specification. The law provides for ten copies; but it was supposed that an arrangement could be made so that the contractor would be able to furnish all such duplicate copies as might be ordered either by Congress or by patentees, upon the payment of a fair compensation for them. As the contract is now given out, this expectation is completely frustrated, and there is some disappointment about it. Five copies of the ten, at least, will be needed for the use of the Patent Office, leaving but five for such disposition as the Commissioner may see fit to make of them. It is to be hoped that it is not too late to correct this difficulty, and I believe the Commissioner will give more attention to it.

As I stated in my last letter, Mr. Harding, who was appointed one of the Examiners-in-Chief, has not accepted the office. I am reliably informed, however, that he has not formally resigned, and may decide to act temporarily, with a view to get the Appeal Board into efficient working order. It deserves honorable mention that the President selected Mr. Harding solely on the ground of fitness. In spite of this, there is nothing connected with the position that can encourage a well-known patent lawyer to abandon a good practice in order to accept an office with small pay, moderate honors, and severe labors. Mr. Harding, from the fact of being retained as counsel in several important patent law cases, could not act independently in the Patent Office without abandoning his clients unreservedly. He will probably hesitate before he takes a step like this.

Commissioner Holloway, in the meantime, has requested D. C. Lawrence, Esq., who has long been connected with the Appeal Board, to assist Messrs. Hodges and Theaker in their duties. This is certainly a creditable move. It shows that the Commissioner means to take good care of the interests of the Office; at the same time, he recognizes the services of an able and upright officer.

The Patent Office is now supplied with printed copies of all the English patents, except a single one (No. 12,054), which have been granted by that government from 1617 down to May, 1860; and if bound up according to the English system, there will be 408 volumes of specifications and 408 volumes of drawings. Professor Jillson, the accomplished Librarian of the Patent Office, informs me that he intends to reduce the number of drawings.

During my stay here I have made a hurried visit to the navy yard, and was not long in discovering the fact that I was in a busy place. The Ordnance Department, especially, presented a scene of unwonted activity indicative of stirring times ahead. This branch of the service is under the superintendance of Capt. John A. Dahlgren, a brave and gallant man, the inventor of the famous gun which bears his name. He seems to be fully alive to all that relates to solid progress in naval science, properly holding all theories in subordination to rigid, practical tests. Without disparaging the services of a single valuable officer in the navy, I think it but just to say that Captain Dahlgren deserves great credit for his untiring efforts to put our navy in the most efficient condition possible to support the civil power. Mr. Russell, the able correspondent of the London *Times*, whose graphic letters to that journal from the Crimea gave him so much celebrity, recently visited the navy yard, inspecting all its departments with deep interest. Captain Dahlgren gave to Mr. Russell an exhibition of the howitzer drill of this country. The howitzer is a short, light cannon, mounted on wheels, and is generally used for field service, but has been adapted to our navy by the efforts of Captain Dahlgren. It is a most destructive weapon in skillful hands. The shrapnell shells can be fired from the howitzer at the rate of four discharges a minute, projecting by their explosion hundreds of musket balls a distance of nearly 200 yards beyond the longest reach of the shell. Mr. Russell expressed much surprise at the rapidity of the firing.

As at this time all matters of science connected with the army and navy are interesting, more attention will be given to the subject.

CAVEAT FEES AND APPLICATIONS FOR PATENTS.—The twenty dollars paid into the Treasury on caveats filed in the Patent Office prior to the passage of the new law, will be allowed toward the completion of the application for a patent, but not as the first fee required on the application. Every application for a patent, except for *design* patents, must be accompanied with fifteen dollars in payment of first fee, and on a patent being ordered to issue, twenty dollars more is required to be paid, except in cases where caveats were filed in the same invention previous to the new law, which went into effect March 4th, 1861. In such cases no second fee is required.

A CURIOUS anecdote is told of Francis II., late King of Naples. A person having despatches for the Minister of Justice, wandered about Gaeta to find his office. Entering a dismantled building, he saw a man sitting on a pile of papers, who answered his inquiries by saying he was the minister. He then asked where he could find the minister of war. "Here," was the reply, "I am the minister;" adding, "Finding myself betrayed by every one I trusted, I am my own minister of war in the morning, chancellor in the afternoon, and prefect of police at night." It was, indeed, Francis II. himself.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association of the American Institute was held, at their room, in the Cooper Building, this city, on Thursday evening, April 11, 1861—Mr. Bull in the chair.

BEER COOLER.

Mr. G. B. TURRELL exhibited a model of Baudelot's beer cooler. The wort is caused to descend from one to another of a series of horizontal water pipes connected at the ends, through which a supply of cold water continually ascends, being gradually heated as it rises, so that the boiling wort first encounters a water pipe nearly of its own temperature, and, as it is cooled and descends, passes over cooler pipes. The beer is thus cooled gradually, both by contact and evaporation. The water thus heated may be used for the next brewing.

INCRUSTATION IN STEAM BOILERS.

Mr. H. N. WINANS exhibited specimens of boiler scale, and stated that he had invented a remedy therefor—a powder to be put into the water used. It is a secret preparation, acting first upon the oxyd of iron so as to remove the scale, and afterwards upon the matters held in solution by the water. Whether it would answer for marine boilers he was unprepared to say.

Professor SEELY, after asking questions with regard to the properties of this powder, said that he was not acquainted with any chemical substance possessing the properties claimed for this.

Mr. STETSON remarked that, in consequence of the necessity of frequent blowing-off at sea to get rid of the salt, such a powder could not well be used for marine boilers, the quantity required would be so great.

HYDRAULIC PNEUMATIC INKSTAND.

Mr. ROWELL exhibited this inkstand, there being a reservoir for the ink communicating by two passages with the bowl where the ink is to be used. Whenever the ink, by use or evaporation, falls below the upper passage, a bubble of air enters and an equal quantity of ink enters the bowl through the lower passage, keeping the bowl always supplied at a uniform hight.

COMPRESSED AIR FOR RAILROADS.

Mr. FISHER, from the Committee on Carson's Plan of Propelling Cars by Compressed Air, made the following report thereon :

The Committee to whom was referred Mr. Carson's plan of a street rail car to be propelled by compressed air have examined the plan so far as it is developed, and have examined reports of experiments that have preceded Mr. Carson's plans, and respectfully report as follows :—

In 1799 a patent was granted in England to Mr. Medhurst for propelling machinery by compressed air. In 1819, Mr. Murdoch, of Soho, and Mr. David Gordon, made calculations and experiments with a view to propel carriages by compressed air; but were discouraged by the difficulties of compression, which was not then well understood. In 1828, Mr. Lemuel Wright, an American resident in England, patented a plan, and built an air carriage; and a Mr. Morin, in 1829, patented a plan for an air carriage. Mr. Alexander Gordon, in his Treatise on Elemental Locomotion, in 1834, gives his opinion that there was then no plan of air propulsion that could safely be engaged in as a speculation. Since that time there have been trials in France on railways and common roads; but although they have been favorably noticed in newspapers, no permanent results have followed them.

The most successful trials of which there are authentic accounts are those of Arthur Parsey and the Baron Von Rathen, in England, about 12 years ago. Parsey worked on a railway, and attained a speed of 20 miles per hour with a small and imperfect engine, under a pressure of 160 lbs., 200 lbs. being the limit prescribed to him, which is too low for practice. Von Rathen worked with 800 lbs. in his receiver on a common road; and arrived at the conclusion that he could run five miles on a turnpike, or 40 miles on a railway, with one charge. Parsey thought that 20 miles was the useful limit for a charge.

So far as appears, both these estimates are mere opinions, and not based on the high rate of speed demanded on railways, which increases the resistance to nearly double that of the speed attained by Parsey.

A first-class express train consumes five tuns of water in a stage of 40 miles. Air being denser than steam in the proportion of 17 to 8, and, so far as your Committee are informed, a cubic foot of steam being equal to a cubic foot of air, it would require 10⅜ tuns of air for 40 miles. The vessel to hold this air, even if welded, must be eight times heavier than the air; hence, 95 tuns will be the weight of the charged reservoir for 40 miles; and a cylinder 6 feet feet diameter and 100 feet long would be required for it at the pressure of 1,000 lbs. per inch. This excessive bulk is impracticable; a quarter or third of it is as much as could be allowed in practice; and at least two stops would be required in 40 miles.

To stop and start such a train involves a loss of $1.20, and $2.40 for two stops, or six cents per mile, which is three-quarters of the cost of coke on such trains. Besides, the time of passengers is of much greater value than the whole motive power; if the two stops should waste eight minutes, it would waste eight dollars in the time of pas-

sengers, or 20 cents per mile, which would drive the best class of passengers to the steam railways.

These considerations are sufficient to account for the disappointment of those projectors, even if there be no other defect in their system, and all they claim—a saving of one-half—be unquestionable. Mr. Carson, aware of these objections, devised a means of charging the air holders while the train is running, so that the air locomotive need not be heavier than a steam locomotive without its tender. It was this idea which induced him to engage in this means of propulsion in England. But on seeing our street railways, which are so short that there is no occasion to re-charge between the termini, he thought it advisable to introduce the air system first on these lines; and for this purpose he has designed a car whose frame is composed of 6-inch lap-welded tubes, in which the air is held.

If we reduce the distance to a tenth we may reduce the weight to a tenth, or 9½ tuns. for a 100-tun train. The boiler and water weigh 16 tuns. Hence, we find an advantage in favor of air on short lines.

As to the cost of compression, it is less at a low density than at a high density, and there is room in a car for air at 300 or 400 lbs. But double this density is necessary for 10 miles; and at most high pressures, four times the power it can give out, when worked without expansion, is required to compress it. But it is practicable, with the link, to work it expansively, so as to give double the power attainable without expansion. Hence, theoretically, half the power will be lost. But this is expected to be balanced by the inferior cost and more thorough use of the fuel at the stations. Locomotives vaporize about 8 lbs. of water with 1 lb. of the best coke; but stationary engines vaporize 12 lbs. with 1 lb. of fuel that costs less than two-thirds as much. And when stops are frequent and long, there is a loss of heat from steam but not from air; and the fireman is not needed for air.

It has been stated that in compressing air the pumps become red hot, unless cooled by water; and that in working it, the expansion cools it so fast as to form ice on the cylinders and pipes; and that a considerable per centage of power is thus lost. The committee have no authentic data on this point; but it is evident that city cars that stop frequently are less liable to freezing than those that run fast and steadily; and that the low pressure practicable on short stages is less liable to such loss than the high pressure necessary on long stages.

The Committee, in view of all the evidence they have seen, deem that, for short lines, air may be better than steam. It is perfectly cleanly. It is likely to cost less; but if it costs more, it may still be advantageous to use it.

Compared with horsepower, it is likely to be both cheaper and more agreeable. A car propelled by air will make no dust; but the dirt made by horses is a costly nuisance. To maintain a given standard of cleanliness in a city without horses, like Venice, costs less than one-third as much as in New York for mere washing; and the wear of clothing is nearly in proportion to the washing; and if all wheels ran on iron, and by elemental power, New York might be as cleanly as Venice; and the saving of clothing, furniture and goods would more than pay for all the cost of riding, rails, pavements, and all else required for the streets.

The cost of horses, compared with steam, is much greater than people suppose, especially at high speed. The English coaches used to cost 36 cents per mile for the horses, to draw 15 passengers at eight miles per hour. Locomotives cost 12 cents per mile, and can draw 300 passengers at 40 miles per hour. On the New York Central locomotives cost 20 to 22 cents per mile, burning wood; on the Baltimore and Ohio, 15 cents per mile with coal; and some of the best engines, with 16-inch cylinders, on a southern road, have worked for 12 cents per mile. The wages, fuel, repairs, stores—all but the interest on engines, shops, and engine houses—is included; but the coachmen used to get no pay from the proprietors, and were paid by the passengers.

Now, if we in this country pay less for horses, it is because we never have kept the high speed of the English. We waste the time of passengers, which is as good as money. Even on city railways, a third of the time might be saved by engines that can start quickly and keep the maximum speed up the grades. But poor as our speed is, it costs more than steam. Mr. Eastman states the cost per mile of running cars on the horse railways near Boston at 25 to 28 cents per mile: or as much to draw a horse car at eight miles per hour as to draw seven large cars at 30 miles per hour by steam.

The plan referred to the Committee claims to be considered as a competitor of horsepower for city railways. Those who suppose that steam is objectionable in cities will probably be glad to find that compressed air can be used as a substitute for it, and can work at much less cost than horses, and thus drive them from street railways, and so get rid of a considerable part of the dirt.

Some of the projectors of steam carriages expected that compressed air would be substituted for steam for small carriages after steam carriages had become numerous enough to warrant the establishment of compressing stations wherever they are wanted; but until such stations are established, it is evident that compressed air cannot be used for general purposes. There are also other means known to chemists. Lardner stated that there were over twenty substances which philosophers regarded as capable of being used instead of steam, and he ventured the prediction that the steam engine would some time exist only in history. While your Committee do not deem themselves warranted in assenting to such anticipations, they certainly consider that such authorities should outweigh the mere skeptics who discourage all attempts at improvement. And they believe that the application of compressed air to street railways is worthy of trial.

J. K. Fisher, John Johnson. } Committee.

Mr. Dibben objected to the use of compressed air; there is a serious loss due to the heat generated by the compression. We have a loss by friction in compressing the air; then this loss from the generated heat, and still a third loss by friction in using the compressed air.

The report was accepted and ordered on file.

PROJECTILES—RIFLED CANNON.

Mr. Babcock resumed his remarks upon the results attained by the shot invented by General James. He objected to the shot, first, on account of its necessary want of accuracy. The belt of soft metal around the shot flies off as it leaves the gun, in consequence of the expansive force of the gases; and unless this belt should separate into equal pieces, their reaction would necessarily turn the shot from its course. If these pieces could perfectly balance each other, the reaction would be balanced; but this does not occur in practice, and therefore the ball must necessarily deviate from its true trajectory. The results attained confirm this statement. Mr. B. exhibited a sketch of the target at Watch Hill, R. I., 13 by 17 feet, placed at a distance of 2,000 yards from the gun. Sixty-five shots had been fired with 80-lb. shots, and there were but ten marks upon the target, a portion of these having been produced by ricochet hits. Captain Dahlgren, in an official report made last December, compares the results which were attained by trials in the Navy Yard at Washington of other rifled cannon with the results attained by the Board of United States Artillery Officers appointed to test General James' projectile, giving the preference to the former. The next objection is that General James' shot is deficient in penetration. This Mr. B. attributed to the honey comb structure of the rear of the shot, causing a serious resistance to the atmosphere. No man would make the stem of a vessel in such a form. In the experiments upon Watch Hill, it was claimed that one shot had passed through 52 inches of oak timber. This was the only shot which passed through the target. The target was three feet thick, composed of squared oak timber 12 inches square, and tied together; and this shot had happened to pass between these timbers, after which it passed through a support 12 inches thick, and another target four inches in thickness. The next best shot was imbedded 18 inches, the next best 15 inches, and the next best but three inches. In throwing shell upon the deck of a vessel, it would be necessary that the angle of elevation should be considerable. The rotation would have a tendency to cause the line of the axis to remain parallel to itself, and consequently the shell would strike the vessel partially upon its side.

Lieutenant Bartlett said that the Minié balls fired at an elevation of 15° or 16°, all strike point on.

Mr. Montgomery thought it improbable that, in the experiments at the Navy Yard, the projectile of General James should have had a fair trial, on account of the disinclination of the department to encourage civilians in such inventions.

Mr. Babcock explained that the projectile of General James was not tried at the Navy Yard at Washington, but Captain Dahlgren merely compared his own results there with other pieces, with the results before obtained by the Board at Watch Hill.

Lieutenant Bartlett said that there seemed to have been a misapprehension with regard to the Dahlgren report, since it had been used by the press to discredit General James' invention. General James aims at precision in the long range; and the great question is, whether he secures that. The French government have introduced the "Carabine à tige," which operates against field artillery, the accuracy of the aim in the long range being such that a section of French riflemen are able to hold in check artillery men that approach them over an open plain. The French government will not give up this range under any circumstances. Their sharpshooters are trained to pick off single men at from 800 to 1,200 yards; and even beyond that range they have perfectly authenticated reports of single shots which have killed single men.

THE GREAT EASTERN.

Mr. Montgomery suggested that the *Great Eastern* should be the subject for discussion at an early day.

NEW SUBJECT.

Mr. Stetson moved that the subject for consideration at the next meeting be "Heating by Steam," which was agreed to.

On motion, the Association adjourned.

The London Exhibition for 1862.

The charter for the Exhibition of the Industry of All Nations has been granted by the English government, and the contract for the building is made. It is to cost £300,000, and will cover a little over 26 acres. It will be 1,200 feet long by 700 broad, exclusive of the space set apart for the display of agricultural implements, which is in rough numbers 1,000 feet long by 220 broad. The walls are to be mostly of brick, with a clear story at the top 25 feet in hight, of iron and glass. The roof is to be of painted wood. The building is to be ornamented with two domes of iron and glass, larger than any others that have ever been built. They will each be 160 feet in diameter, and will rise to the immense hight of 250 feet. The exhibition will open on Thursday, the 1st of May, 1862.

Occupation of Women in France.

In France woman is permitted to engage in many occupations which are performed with us entirely by the male sex. She often acts as ticket-dispenser at railway stations, as bookkeeper at hotels and shops, and as attendant on the heaped tables of the reading room.

The watchmaker consigns to her delicate touch the finer parts of his mechanism, and the jeweler the setting of his costly gems. The wood engraver expects his most delicate and tasteful cuts from her hands; and the picture dealer invites her to plant her easel in the Louvre of Luxembourg, to reproduce, as she well can, the masterpieces of ancient or modern art.

Nor is the mallet of the sculptor considered to disgrace the hands of a princess—one of the noblest statues of modern times, representing Joan of Arc clasping the consecrated sword, being the production of a daughter of the late citizen king. The individual and social advantages which the honor that is thus paid to labor brings are incalculable. Pride is never permitted to interfere with usefulness; and many a young woman, who would have been debarred, as with us, by its pernicious influence, from the honorable employment of her powers, is enabled, by the wiser and more merciful arrangements which obtain in France, to secure a virtuous and comfortable independence.

Science Aiding Justice—Hunt for a Criminal.—The murderer of the solitary passenger, Judge Poinsot, in France, was tracked, after jumping off the railway train, in the following manner:—An exact impression of his foot-mark was taken, a few hours subsequently, by the following ingenious process: A sort of gridiron, made of wire, was placed over the imprint, an inch from the ground. On this gridiron was deposited a thin piece of tin, covered with burning charcoal. In a short time the ground beneath was heated to the desired extent. The gridiron was then removed, and with the aid of a hair sieve the impression was sprinkled with a layer of stearine, reduced to an impalpable power, by dissolution in alcohol and sudden immersion in cold water. The powder obtained by the precipitation of this mixture is so light that its fall does not change the position of a grain of sand. As soon as it touched the hot ground it melted and disappeared. The soil was then given time to cool, after which the imprint, fully impregnated with stearine, was dug up entire, and placed upon a square piece of cloth, whose corners were then gathered together, so as to form a kind of sack. Moulding plaster was then poured upon the imprint, and the operation was complete. Such is the accuracy of this process, that it not only reproduces the general outline of a foot, or its covering, but every minute particularity. If a bare foot, it shows the exact shape of the sole, and the relative position of the toes; if a boot or shoe, the amount of wear sustained by the sole and heel, the number of nails, &c.

Curious Animal.—Australia is a land full of natural wonders to us. Great tracts of that country are covered with balls of quartz, shot, as it were, from some lunar battery; the natives kill the jumping kangaroo by shooting the boomerang "round the corner;" and there is the *ornithoryncus*, which puzzles naturalists to classify by its paradoxical peculiarities. It appears to be a link between the quadruped, bird and reptile. Its body is something like that of a beaver; it has four short legs and is web footed, and on its little flat head it has the bill of a duck. These creatures live a great deal in water; their resorts are quiet creeks fringed with weeds, among which they search for food. They burrow in the banks of streams like moles; in disposition they are timid, playful and harmless, and they have been made very amusing pets.