Correspondence.

How to Fill Barometer Tubes.

To the Editor of the Scientific American:

I have noticed quite a number of inquiries how to fill barometer tubes, and quite a number of different answers, through your paper. I will give you my experience. I bought a barometer, and in bringing it out into this rough country the mercury got air into it. I went to work to remedy the matter by a shaking, but it was no go. At last I emptied the mercury all out, and then I was in trouble. Instead of two air bubbles I had a dozen. I was not scientific, and I worked for a week at odd times toget the air out of the tube, but without success. I thought of your paper (that was eight years ago), but I did not like to give up beat. So I scratched my head and sat and looked at the thing awhile; then I went out into the yard and got a straw, and pushed it down into the tube, and all my trouble vanished. I was happy because I had conquered. I afterward told the maker of the barometer, and he adopted my plan immediately. I think mine a better plan than you give in your answer to J. R. M., No. 1, Notes and Queries, in your paper of October 25, 1879. G. L. B.

Shamburg, Pa.

Traveling Rocks.

To the Editor of the Scientific American:

In the August number of the SCIENTIFIC AMERICAN, page 88, you have an interesting article from the pen of the Earl of Dunraven on "Traveling Rocks," which you very justly attribute to the action of ice in the lakes.

I have watched this phenomenon for several years past, and believe I have found its true cause in the *expansion* of the ice during the winter, which is particularly noticeable in lakes that are shallow near the shore.

In one large lake in Queens county, called *Malēgēuk* in Indian, but misrepresented "Malēge," these traveling rocks may be seen in different stages of progression.

This lake is shallow on one of its shores, and covered with loose bowlders of all sizes. Ice forms to the depth of two or three feet, embracing in its firm grasp all the loose rocks lying in the shallow water. During the winter the ice in the lake *expands* from the center, carrying with it shoreward all the loose rocks and *débris* embedded in its icy fetters. The extent of this expansion varies with the thickness of the ice, the length of the winter, and the size of the lake. It is not unusual for it to expand and carry with it rocks a distance of twenty feet during a winter.

In a part of this same lake the opposite shores are bounded by abrupt and steep walls of rock, over which the ice cannot expand and spread as on the shallow level shores. But as expansion continues nevertheless, as a result, there is first observed a slight upheaval of the sheet of ice in the center of the lake; next a fissure extends across the lake; then the edges of the fissure gradually rise up until there is a ridge like the roof of a house, oftentimes so high as to bar the passage of teams.

In 1871 I found such a ridge in this lake so high and steep, with a deep crack in the ridge extending across the lake, that I could not drive over it with a horse and sleigh, and was compelled to go ashore and pass around it.

This rock movement does *not* take place in tidal waters; the constant rise and fall of the tide prevents the ice freezing fast to the rocks. The expansion, however, goes on the same.

In Lahave river, at Bridgewater, where the tide ebbs and flows, I have observed the expansion of the ice from the center toward the shores to amount to 20 feet during a winter. As a proof of this, a steam tug was "caught" at one of the wharves by the sudden freezing up of the river, and could not be removed to an anchorage. The ice expansion forced her so tightly against the wharf that the ice on the channel side had to be cut away from her sides, and the tug moved out from the wharf and moored to the outer edge of the opening. This operation had to be repeated several times during the winter, so that in the aggregate, 12 to 15 feet of ice were cut away, and the tug moved all of that distance away from the wharf. I have known the same thing to occur with other vessels similarly situated.

Again, the western bank of this river at this point is lined with perpendicular wharves of crib work; the opposite shore is shallow and flat. The ice expands and is forced upon this shore 30 feet beyond the highest tide during a winter, and forms a complete and safe road to the river below, when all snow and ice has disappeared from the other roads.

The rocks here do not "travel," as the tide lifts the ice off of them before it can freeze them solidly in its grasp.

This phenomenon is not confined to the localities mentioned. I have noticed it in a dozen other lakes and rivers in Nova Scotia.

There can be no doubt but that these "traveling rocks" are attributable to the expansion of ice. Will some scientist now explain *why* ice expands thus, against the common theory that cold contracts and heat expands?

A LUSUS NATURÆ.

While my pen is in the ink I will describe a *Lusus naturæ* that came under my observation.

A farmer in this county brought with him from the United States, some years ago, a sample of wheat bearing a different name from any growing here. He distributed it among his neighbors for the purpose of testing it on different soils.

A handful was given to W. V., of Ohio, Lunenburg county, who sowed it, and resowed the proceeds for two years successively. When he harvested his crop the result was nine bushels; but instead of wheat, which he had sowed and gathered for two years, he had *rye*. The straw was *rye straw*, the heads were those of rye, and the grain itself was *rye*—most assuredly *rye*.

I was curious to taste the bread from this grain, and sent for some of it; but, satisfied that his crop was rye, the farmer had previously thrown it in with his other rye, from which I could detect no difference.

Can any of your farmer readers account for this strange freak of nature? I may add that this grain was always sown by itself, and not near any other grain.

I heard of a similar case a few miles distant, but whether from the same seed I did not learn. J. W. A.

Bridgewater, Nova Scotia, Oct. 10, 1879.

The Island of Fernando do Norhona.

The island of Fernando do Norhona, says Mr. Moseley in his "Challenger Notes," is in latitude 3° 50′ S., and is about 200 miles distant from Cape San Roque, the nearest point of South America. The main island of Fernando do Norhona is about four miles in length, and nowhere more than four and a half broad, and the length of the group formed by it and its outliers is seven geographical miles. The main island is long and narrow, and stretches about northeast and southwest.

At the eastern extremity is a series of islets known as Platform Island, St. Michael's Mount, Booby Island, Egg Island, and Rat Island. On the southern side of the main island are several outlying rocks, one of which, called Les Clochers or Grand Père, appears as a tall pinnacle with a rounded mass of rock balanced on its summit.

At about the middle of the northern coast of the main island is a remarkable column-like mass of bare rock, which projects to a height of 2,000 feet, and is known as the Peak. The southwestern extremity of the island runs out into a long, narrow promontory, which is composed of a narrow wall of rock. In this, at one spot near the sea level, the sea has broken a quadrangular opening, through which the sea dashes in a cascade. This opening, known as the "Hole in the Wall," is visible from a considerable distance at sea.

At the opposite extremity the island terminates in a low sandy point, with sand dunes upon it, beyond which stretch out the outlying islets already referred to. The peak forms a most remarkable feature in the aspect of the island as viewed from the sea, and appears to overhang somewhat on one side. One other hill in the island is 300 feet in height.

The island is volcanic, but has evidently undergone a vast amount of denudation, so as to obliterate all traces of the centers of eruption. The Peak is composed of phonolith, or clinkstone, as is also St. Michael's Mount, which is a conical mass 300 feet in height.

Rat Island and Booby Island are formed of a calcareous sandstone, an Æolian formation like that of Bermuda, but here containing volcanic particles intermixed. This rock is weathered in a closely similar manner to that at Bermuda, the exposed surface being covered with irregular projecting pinnacles with excessively sharp, honeycombed surfaces, in places on Rat Island as much as two feet in height.

On the western side of Rat Island, close to the shore, a beach of huge oval pebbles of phonolith is embedded in this sandrock. In Platform Island the sandrock overlies columnar volcanic rock. The main island is thickly wooded, and appears beautifully green from the sea.

Improved Patent Laws.

The prominent position assumed by American manufactures and arts, particularly in the domain of the mechanical, during the past decade, has excited much inquiry among foreigners into the workings of a system which has produced such fruitful results. That the success of American inventions is, and their admitted standard of excellence has been, due to the stimulus produced by well regulated patent laws, cannot be doubted. There is nothing sluggish in the mind of the American inventor, and the restless activity of his genius, aided by comparatively perfect and cheap protective laws, has brought about a condition of things the magnitude of which the European heretofore has not been able to fully comprehend. The English, German, and French genius is not naturally sluggish, for we can point to those of that nationality living in the United States who have become so imbued with the spirit of our institutions as to become, so to speak, "thoroughly American." We cannot, in fact, make any distinction in this country between nationalities. It is the better understood capacities of human nature, and laws calculated to bring out and develop genius, which have accomplished a unification of nations, as it were, and established a common standard of intellectuality.

On their native soil, however, the condition of things has been and still is adverse to the development and protection of mechanical genius, and in exceptional cases has forced the utilitarian ideas of the people into the domain of the psychological, the mystical. In these departments the palm must be accorded them. A revolution in ideas is, however, occurring in the governing powers of these nations, and learned writers are beginning to see that the practical development of nationality is due more to the advantages accorded material progress than those which have been heretofore awarded to literature and *belles lettres*.

In England the theory of the patent law is, to a great extent, founded upon the benefits accruing to the crown upon the exercise of the royal prerogative which grants the monopoly. The expense is heavy, and calculated to destroy rather than nourish the fires of genius that cannot brook control. In France the system has been somewhat broader in extending its benefits to the inventor, still retaining, however, the idea that the government has bestowed upon the inventor a privilege as distinguished from protection only. In the United States the main idea is that the inventor of any new and useful device is conferring a benefit upon the nation, and should, therefore, be protected in his invention.

This is the correct theory, because it has succeeded in producing such astonishing results that other nations are gradually adopting it. A strong effort is being made to abolish the doctrine that whatever franchises are granted by government are granted purely voluntarily and by virtue of the exercise of a gracious prerogative. Public policy has been no element in the granting of a patent, and the only other element of any advantage to the inventor—encouragement—wholly disregarded. Royalty has been jealous of parting with its abstract rights as granted it by the *doctrinaires* of an impractical age.

England is seriously contemplating an entire change of front in regard to the policy of her patent laws, induced, no doubt, by the reaction that has set in against the policy she has always adhered to. Under the English system it is not necessary to be an *inventor* to obtain a patent—the *first introducer* receives the reward due the discoverer in some other nation. It is, substantially, a reward offered to theft. The idea was, doubtless, good in theory, but disastrous practically, as was discovered not long ago, in the case of the English patent rock drill, which was introduced in Japan, and there found a copyist in an ingenious native, and the English invention was abandoned for the use of the home-made machine. This practical result of their own policy has opened the eyes of English manufacturers to the glaring defects in their patent system, and we may look for a speedy change in the whole, for when once the wedge of improvement has been inserted, ancient customs and ideas must give way to modern utilitarian ideas.

Germany is stirring to improve her patent laws, but they still contain many defects apparent to an American, particularly in the hampering restriction of compulsory working of patents within three years or revocation. Many applications have been refused on the ground that the German law prohibits the grant of a patent a description of which has been published in the *Official Gazette* of the United States—a course which must inure to the hardship of American inventors, but there is no other way than for inventors to shape their course accordingly. The German patent office, not being alone self-sustaining, the fees are high; but it is said that the receipts are now exceeding the expenditures, and a reduction of fees to a reasonable limit will soon be made.

As to the compulsory working of patents, experience in Belgium, France, and Austria has shown it to be unjust, and the enforcement of the law in that respect practically abandoned, except in Germany.

Dr. Malapert, Advocate of the French Court of Appeals, in a new commentary on the patent laws of France, substantially adopts the American idea of protection being due to the inventor, both as an encouragement and as a recompense for the benefit accruing to the public at large after the expiration of the patent; but seems unwilling to declare that the protection accorded the inventor possesses an absolute property in the practical results of his new ideas.

The subject of patents, on account of the great attention paid to it at the present time, will receive a close investigation, and the adoption of a nearly perfect system for the regulation of this peculiar species of property follow.—*Mining and Scientific Press.*

The Skilled Artisans of France.

The *Revue Industrielle* states that in France of late years complaints have been made from many quarters that French artisans connected with many of the higher branches of skilled industry no longer possess that perfect mastery over their several handicrafts which up to recent times had honorably distinguished them and won for various classes of French articles a high reputation abroad as well as at home. In watches, surgical instruments, and in mathematical and astronomical apparatus French workmanship has so decidedly deteriorated that the attention of the government has been called to the subject. With a view to effect some improvement, the Minister of Education has ordered that in the Apprentices' School at La Villette, Paris, a number of youths, after passing through the ordinary course, should henceforth devote three years additional to the study of mechanism, especially to the more delicate kinds of mechanical work. It is also intended to open a similar establishment in another quarter of Paris. The municipal authorities of the French capital are also taking steps to encourage the acquisition of mechanical skill by young workmen, and have just granted to M. Bouccart, a noted mechanician, who already had six apprentices, a subvention of 4,000f. on condition of his taking in ten additional apprentices, who are to be under the supervision of the city authorities for three years.

The source from which the above is derived does not state that permission was obtained from any trade union allowing M. Bouccart to employ this extra number of apprentices. It would have been required here or there would have been a great ado among the trade-unionists.

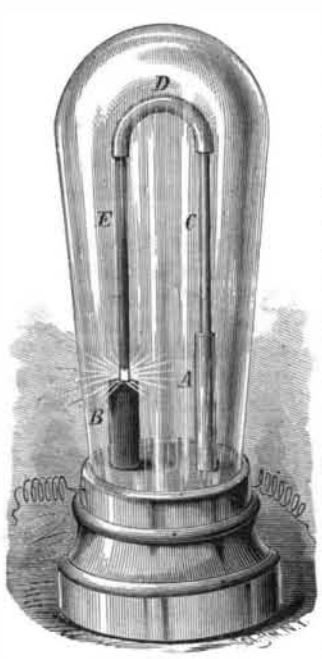
More Workmen Needed.

In none of the leading industries of the country is there such a demand for skilled workmen as with the pottery trade, in which the supply, from purely natural causes, is greatly short of the requirements. The pottery industry is of comparatively recent growth, as, though established a great many years ago, it was generally carried on in a small and desultory way, so that few skilled men were required, and few apprentices were inducted into the arts and mysteries of the guild. Within the past twenty years, however, the entire aspect of affairs has been changed. Potteries have multiplied with wonderful rapidity under our beneficent system of protection, and from supplying merely a tithe of the wares used, have now come to control nearly the whole business of the United States in this line. This growth, while almost phenomenal, has been perfectly healthy, and there is every indication now of continued and perhaps still greater prosperity in the future. But to make it so we need large additions to the number of our skilled artisans. All the workmen now here have all the work they want, and in some cases more than they want, at wages which are almost princely in comparison with those received by their fellow-craftsmen in Europe. No disposition is shown among master potters to cut them down, but, on the contrary, a personal interest seems to be taken in the workmen, and everything that could in reason be asked of the employer is, as a rule, done to secure the comfort and well-being of the employe.

To add to the need of further workmen, additions are being made to the plant of nearly every pottery in the country, while from every hand comes news of new ones projected and to be immediately erected. In this state of affairs the working potters of Europe may find a solution of their present difficulties in emigration. If better wages, better and cheaper food, and more comfortable homes have any attractions for them, the needed help may soon be expected from Great Britain, where wages are being further reduced and the time of working curtailed.—*American Pottery Reporter.*

AN ELECTRIC LAMP FOR AN ENGLISH SHILLING.

Blazoned in brilliant colors on a box cover in a show window not a long distance from this office is a representation of a miniature electric lamp, below which are these words, "Real Electric Light. Price 1*s.* This wonderful lamp will produce instantaneously an electric light of great steadiness and power. Its action being automatic, it requires no attention, and will burn for hours, costing a trifle only above gas. It is adjusted readily for immediate use, and is so simple that a child can work it." The box contains a little lamp like that shown in the engraving, and all that is said in regard to it is undoubtedly true, providing the lamp is furnished with a sufficiently strong and constant electric current; but to generate the required current cheaply and conveniently will probably trouble our youthful experimenters, as it has the older heads for a half century. In fact we think a battery capable of running the lamp for any considerable length of time can hardly be made for less than $25.



TOY ELECTRIC LAMP.

Directions are furnished for making a battery; but a little experience in this direction will soon make plain the unpleasant fact that a strong and steady current cannot easily be maintained by the use of batteries. It will be found that a great deal of electric energy will be required to maintain a single lamp, even a toy lamp. A boy with one of these lamps is in about as good a position, so far as the question of general electric lighting is concerned, as the most experienced in these matters.

The lamp costs 75 cents of our money, and any boy can make it. From the base project a brass tube, A, and a carbon cylinder, B. These are each provided with a wire which projects from the base to be connected with the electrodes of a battery. A wire, C, fits loosely in the brass tube, A, and a curved tube, D, is soldered to its upper end. A slender carbon pencil, E, is inserted in the curved tube, D, and rests upon the carbon cylinder, B. The whole is covered with a glass shade. When the current is allowed to pass through the lamp the light will appear at the juncture of the carbons, E B.

Twin-Cylinder Car.

The Prosser twin-cylinder car is a Chicago invention, by which it is claimed wheat can be transported from the West to Eastern markets at a cost of two cents per bushel. This car consists of four large cylinders of thick sheet iron, 8½ feet long and 6 feet in diameter on the inside. The cylinders are hooped with tires having flanges to suit the gauge of the railroad they may be running on. These cylinders are held together by a frame. Each of these contains 250 bushels of wheat, making the capacity of the car 1,000 bushels. The cylinders are loaded from the top. The frame holding the cylinders together two by two is so arranged as to permit a compound lateral and vertical movement, thus relieving them from a strain that would be inevitable from their direct connection with the frames in the ordinary car. An aperture in the center of each end of the cylinder admits air into the interior, which is expelled through a number of minute holes in the periphery, keeping a constant current of air circulating through the wheat while the car is in motion.

The load in the Prosser car is *not* supported on axles. It rests *directly on the track.* The cylinder revolves with the wheel. The load rotates in harmony with the wheel, and its center of motion and rotation corresponds with that of the wheel; consequently there is an immense saving of the power required to draw the car. As the diameter of the car wheel is about three times that of the ordinary car wheel, it is a necessary deduction that, if the weight of the Prosser car and load were equal to the ordinary car and load, an engine could draw three times as many of the former as it could of the latter, leaving the additional advantage of the load's resting directly on the track entirely out of the question.

The new car, while not occupying more space upon the track than the ordinary car, and though much lighter than the latter, has a capacity of 1,000 bushels, while the capacity of the ordinary car is about 350. An additional advantage claimed is, that through the holes in the ends of the cylinders, and the minute holes in their peripheries, a current of air is forced through the wheat in the cylinder, carrying off the heat and vapor developed by the action of the grain, drying and cooling it, and raising its quality.

Opening of the Exhibition at Sydney, Australia.

The ceremony of opening the Sydney International Exhibition was performed on the 17th of September, in beautiful weather, by Lord Augustus Loftus, the Governor of New South Wales. The day was observed as a public holiday, and the streets were densely crowded by the townspeople and visitors from all parts.

The proceedings began with a procession of the public bodies, who were followed by Lord Augustus Loftus, the Marquis of Normanby, Governor of Victoria; Sir W F. D. Jervois, Governor of South Australia; Mr. Weld, Governor of Tasmania, with their respective staffs; the Colonial Ministers, and the military, naval, and civic authorities. The procession paraded the principal streets and reached the Exhibition at noon, where Lord Loftus performed the ceremony of unveiling the statue of Queen Victoria amid great enthusiasm. His Excellency then proceeded to the dais, which was surrounded by a brilliant assemblage, consisting of the commissioners of the foreign countries and of the Australian and other colonies which have sent exhibits to Sydney, the colonial members of Parliament, the clergy, judges, and others. The whole spectacle was of a most imposing character. After the choir had performed an inaugural cantata, the Sydney Commissioners presented an address to Lord Augustus Loftus, asking him to declare the Exhibition open. His Lordship, in replying to the address, congratulated the colony upon the success of its efforts to gather together in its capital a representation of the arts, and of the achievements of the industrial forces of the entire globe. The event, he said, was an epoch in Australian progress. After welcoming in appropriate terms the various foreign and colonial representatives, the Governor formally declared the Exhibition open. The announcement was received with the firing of salutes; and the choir sang the National Anthem.

The Colonial Governors were then conducted through all the courts of the Exhibition, and were introduced to the several foreign commissioners, who awaited their approach in the sections devoted to the exhibits of their respective countries. The whole ceremony was universally considered a great success. The concourse of people was immense. The main building, which is styled the Garden Palace, is much admired. The exhibits represent the products of England, almost all foreign countries, and the Australian and other colonies.

There is a gigantic display of agricultural implements. The machinery-in-motion department is on a great scale, and there is every reason to believe that this department will be of great interest and practical use. The pottery and glass section is very good and extensive. There are 800 British industrial exhibitions and 513 fine art entries, including photographs. Germany has 695 entries, including 108 fine art; Austria, 170; France, 350 industrial and 168 fine art; Belgium, 236 industrial and 50 paintings; America has 150 industrial collections. Among the best filled sections are railway apparatus and material, steel and cutlery from Sheffield, guns and miscellaneous manufactures from Birmingham, Manchester goods, sewing cottons, cloths, hats, India-rubber manufactures, chemicals, preserved foods, lamps and stoves, paper and stationery.

Some Modern Explosives.

At the late examination of the torpedo class at Newport the Board of Examiners spent some time in the building devoted to explosives. The reporter thought the interior appearance of the place was decidedly uncanny.

Ranged on a table were a hundred or more samples of the various explosives, as well as of their innocent ingredients—nitroglycerine of all ages, dynamite, fulminates carefully kept under water, picric powder, guncotton, and gunpowder—in many forms. The picrates of various substances shown were made at the station by Professor Hill and Lieutenant Commander Elmer, a student in the last class, and present a show of brilliant shades of color. The picric powder is comparatively of recent date, and is intended to replace gunpowder in torpedoes. Professor Hill, who established its proportions and made it at the powder mill, thinks it fully as safe as gunpowder, not so easily affected by moisture, and of more than double force. It is composed of picrate of ammonium, potassium nitrate, and charcoal, and looks like coarse green tea.

Professor Hill conducted the examination. One of the most startling points of this programme was the free and easy manner in which the experts handled these wicked explosives. They were hammered, burned up, and let fall without an explosion, seeming to be perfectly harmless when properly made, until the proper means of firing was used, and then they go off with sudden and terrific violence. In fact, gunpowder was proved to be an infant in comparison, nitroglycerine being thirteen times stronger and exploding perfectly in water, the water pressure rather packing it and increasing its power. The explosive gelatine was shown to be a queer looking mess, in cakes about one inch in thickness, and appeared like innocent calves' foot jelly or soft glue. This was handled with perfect safety, is difficult to explode, and when set fire to it will burn up. A piece laid on a moderately hot stove will fizzle away like a slice of bacon. To explode it, a large fuse of fulminate of mercury was required. This was confined. A lump that had been blown to pieces by a weak fuse without exploding was simply shattered. When properly fired its force was enormous. The camphorated gelatine was shown to be particularly safe. It keeps well in a warm temperature, thus giving it an advantage over dynamite, which exudes in warm climates. This gelatine was made by adding to nitroglycerine a small percentage of camphor and photographer's guncotton, previously dissolved in alcohol and ether. The whole is gently heated, when it becomes a pasty yellow cake, with a strong smell of camphor.

ON A RESONANT TUNING FORK.

TH. A. EDISON.

For the purpose of rendering audible the sounds produced by tuning forks they are generally mounted upon resonant boxes, containing a column of air whose vibrating period is the same as that of the fork. I have devised a modification, in which the box is dispensed with, the resonant chamber being formed by the prongs themselves. To make the fork, a thick bell metal tube has one end closed, a slit is sawed through the center of the tube nearly to the closed end. This divides the tube and gives two vibratory prongs. To bring the prongs in unison with the column of air between them the tube is put in a lathe and turned thinner until unison is attained, whereupon the sound is powerfully re-enforced.

Edison's Tuning Fork.

Crocodile Oil.

Mr. Purcell, of Agra, states that, if it were found of any commercial value, he could obtain a large quantity of crocodile oil. Dr. Kanny Loll Dey Bahadoor, Calcutta, states that, on examination, crocodile oil contains a larger proportion of solid fat than either neat's foot, or cod liver, or any other fish oil. It solidifies at the melting point of ice, while neat's foot oil only slightly thickens, and the others scarcely thicken. He also tried the softening quality of the various animal oils on leather, and, on comparison, found that leather treated with crocodile oil remained much stiffer than that treated with other animal oils. Still, it may be worth testing by manufacturers.

Sea Water Gargle in Chronic Catarrh.

Professor Mosler, of Greifswald, says, in the *Berlin. Klinische Wochenschrift,* that he has for some years most successfully treated patients with chronic catarrh of the throat by gargling with sea water. Special rooms for gargling have been erected on the sea shore in some watering places, according to his directions. It is, however, essential that the patients should be given special directions how to gargle. As the affection is generally located in the naso-pharyngeal space, it is necessary that part of the water should come in contact with the nasal cavity. In order to attain this, the gargling movements must be combined with movements of deglutition. A marked improvement in the state of the patient follows as soon as the latter has acquired this particular art of gargling.

Business of the Patent Office.

A report of the Commissioner of Patents, just issued, shows that during the twelve months ended June 30 last, 19,300 applications for patents were received and 2,674 caveats filed, 12,471 patents issued, 1,547 trade marks and labels registered, and 828 patents granted but withheld for payment of final fees. The total receipts of the office were $703,146, being $154,495 in excess of its total expenditures.