made by the Senator to the other bill was obviated. It was quite impossible for the Senate committee to fix the sum, supposing Admiral Dahlgren's estate was entitled to compensation, and he could see no means of adjudicating in the matter better than referring it to the Court of Claims.

Mr. Logan said the mere reference of the matter to the Court of Claims would be an admission by the Government that it owed something, and that the Court was referred to to ascertain the amount. They would thereby establish the principle that the use of every invention used by the Government must be paid for. The Dahlgren gun is a good one, it was true; but the fact that it was used in the army and navy to-day did not justify them in paying an amount of money for it, if it were done in violation of a principle that the Government ought to establish. This principle was that where officers in the employ of the government, drawing a salary, devote their time to perfecting inventions, the invention ought to be the property of Government. All his remarks, he said, were made in order to record his protest against the establishment of a wrong principle which would eventually cost the Government millions of dollars.

On the suggestion of Mr. Windham, the Secretary read from an opinion by Judge Holt on a decision given by the Chief of Ordnance, General Dyer, wherein the General took the view held by Senator Logan. The opinion stated "that no precedent has been discovered in which the 'principle' understood by General Dyer to be an 'admitted' one has been in any manner acknowledged. On the contrary, there are believed to have been repeated instances in which the opposite view has been taken by the Government."

Mr. Sherman thought no one could question the fact that Admiral Dahlgren had a property right in the use of his invention. When the government granted a patent, it recognized an existing property right in the patentee for a certain invention, and it had no more right to appropriate that property right than any individual had.

The bill was reported to the Senate without amendment, and ordered to be read the third time.

THE SEWING MACHINE RING IN A NEW ROLE.

The application, made to Congress by the Sewing Machine Ring for the revival of the expired Wilson patent, has utterly failed and the case has been withdrawn. But the same parties have put in another appearance, fully determined to obtain an extension of their monopoly in some shape or other. They have now applied, as the assignees, for the revival of the old Akins and Felthousen patent, which was originally granted Aug. 5th, 1851 for fourteen years, and then extended for seven years. This extended term ends on the 5th of August, 1872, when the patent becomes the property of the public, unless Congress interferes by a special act for its further extension.

The Akins and Felthousen machine, as originally patented, was a crude device, widely different from the present mechanisms. But by reissue, with claims unfairly broadened, and by act of Congress, the assignees hope to be enabled to prevent all other sewing machine inventors and manufacturers from producing their goods. They anticipate that the public will thus be compelled to continue to buy sewing machines, of the Ring exclusively, at exorbitant rates.

In our previous discussions of the sewing machine business, we have shown how gigantic is the monopoly now wielded by the small clique known as the Sewing Machine Ring; how they oppress our poor working people by charging them from forty to sixty dollars for the same sewing machines that they sell, at a great profit, for half the money on the other side of the Atlantic, where they enjoy no patent monopoly; and how they have always opposed other makers and inventors of improved machines, by refusing to grant them licenses on reasonable terms. It is needless for us to go over these charges again. Their general correctness remains undisputed, and they apply with equal force to the Akins and Felthousen case as to the Wilson patent and the other patents controlled by the Ring.

The public is tired of the exactions of these sewing machine monopolists. They have grown immensely wealthy; they have reaped the richest rewards for whatever they have done in developing the business. We earnestly hope that Congress will turn a deaf ear to this new petition, and let the sewing machine monopoly die a natural death.

Fatal Boiler Explosions.

The boiler of the *Epsilon* tug boat exploded at the foot of Burling Slip, East River, New York, at half past one p. m., on Monday, May 27. The captain and fireman were killed; the boat was totally destroyed, the fragments being scattered over the adjacent streets. Several minor casualties occurred from the disaster. It is stated that the boiler was in good repair, having been recently examined and tested.

A new boiler at Philadelphia exploded on the same day, causing one immediate death and fatally wounding one person, besides injuring five others. The engineer was the man killed, and we are informed that he had *chained down the safety valve* to get up steam. Mr. L. Phleger, the well known boiler inventor, discovered the criminal act, and was removing the chain when the explosion occurred. Mr. Phleger escaped uninjured.

AN extensive coal bed of remarkable depth and excellent quality has been struck near Raus, at Schonen, Sweden. At a depth of 566 feet, eleven strata of coal had indeed been pierced, but none of these exceeded in depth 1¼ feet. Five feet farther down, however, a bed was struck with a thickness of 8½ feet. The borings have been continued, and are believed to prove satisfactorily the existence of an extensive coal bed.

SCREW ELEVATORS.

One of the earliest and probably the safest form of hotel or passenger elevators ever introduced was the screw elevator invented by the late Mr. Tufts of Massachusetts. It consists of a large revolving screw standing in the center of the hoistway and reaching from top to bottom of the building. To the elevator platform is attached a nut, which fits the screw, and the revolutions of the latter carry the platform up and down with great regularity and perfect safety, the platform being in fact a part of the nut. No lifting ropes are employed, and passengers riding upon the machine, if they understand its construction, enjoy a sense of security which they never can have when they trust their lives to suspension ropes and safety clutches.

In view of these considerations, it is with regret that we learn that the proprietors of the Fifth Avenue hotel in this city have determined to remove the excellent screw elevator, that has served their guests with so much safety and success for many years, for the purpose of putting in a more recent patent suspension rope elevator. We shall miss a good old friend when the screw is gone. It is a noble piece of mechanism, and we always admired its massive proportions and stately movements. It is still in splendid order, capable of useful service for a hundred years to come, and whoever obtains it will possess an enduring and effective machine. It is true that the screw elevator obstructs the platform and moves a little slow. But for passenger use *safety* is the first consideration; roominess of the platform and speed come second. The Continental hotel, Philadelphia, is provided with a screw elevator, the counterpart of the Fifth avenue machine.

The Vienna Exposition of 1873.

The Archduke Rainer, President of the commission for preparing the necessary arrangements for the Exposition of 1873, has, in a circular dated March 20, 1872, made known that the owners of the beet sugar factories and sugar beet farms of Austria have authorized him to offer the following prizes for the best cultivators and machinery for harvesting sugar beets:

1. 1,000 and 500 dollars respectively for the two best beet sowing machines.
2. 250 dollars for the best harrow or land roller.
3. 50 dollars for the best beet weeder.
4. 500 and 250 dollars respectively for the two best beet cultivators.
5. 1,500 and 1,000 dollars respectively for the two best beet harvesters.
6. 100 dollars for the best beet cleaning machine.
7. 100 dollars for the best hoe.
8. 150 dollars for the best tool for raising the roots out of the ground.

All machines and tools competing for these prizes have to be delivered at the grounds of the Exposition prior to the month of March, 1873, excepting the harvesting machines which will be accepted as late as September, 1873. All machines and tools will be practically tried on fields of beet roots and in all kinds of soil, unless specially intended for certain qualities of soil and so specified. Awards will be made not later than November, 1873, but only for machines found to be entirely new and fully answering the purposes for which they are intended.

As regards other machinery intended for the Exposition from foreign countries, information is given that all working machines should be announced at Vienna prior to August 1, 1872.

The Inventor of Puddled Steel.

Anton Lohage, the inventor of puddled or wrought steel, died on April 21st, at Unna, in Westphalia. Being the son of a poor peasant, he was sent to an elementary school, and when twelve years of age, he entered the service of a richer peasant as sow herd, and passed through all the stages of an agricultural laborer. When twenty-one years old, he went to work at a factory, and developed there such skill and capacity that he was sent for two years to the factory school at Hagen, where Director Grothe improved him so much that he could be sent with advantage to the Polytechnic School of Berlin, where he studied for three years, and supported himself, partly by a small purse which was granted him, partly by working as a chemist in a factory. In 1848, he began his trials at the Haspe Iron Works, near Hagen, in Westphalia, and after some time he succeeded in producing steel of good and uniform quality by the ordinary puddling process. His invention was patented, 1850, in England by Ewald Riepe, and introduced at Low Moor; but owing to the quality of the pig iron, its use was very limited in England until, in 1858, Mr. William Clay introduced the process on a large scale at the Mersey Steel and Iron Works, Liverpool. In Germany, about 100,000 tons of puddled steel are made every year, and it forms the principal material for Krupp's celebrated cast steel.

FIREPROOF BUILDINGS.—If you will have wood floors and stairs, lay a flooring of the thickest sheet iron over the joists, and your wood upon that, and sheath the stairs with the same material. A floor will not burn without a supply of air under it. Throw a dry board upon a flat pavement, and kindle it as it lies if you can. Prevent drafts, and, though there will be fires, no houses will be consumed.

YEDDO, the capital of Japan, has lately suffered by a great conflagration. Five thousand buildings were burned, comprising 17 large government offices, 60 temples, 287 smaller government offices, and 4,753 dwellings, shops, etc. 20,000 people were rendered homeless. It is to be hoped that the Emperor will now order some steam fire engines.

Alloys of Copper and Zinc.

These two metals will mix with each other in all proportions. The color of the alloy varies with the proportion of zinc present, from almost copper red to zinc white. The alloys are made by mixing granulated copper and zinc in proper amounts, placing the mixture in black lead or Hessian crucibles, and putting these in a suitable furnace. The alloy must be removed as soon as melted, since by exposure to a high temperature it loses zinc.

Several of these alloys have received distinctive names. Pinchbeck contains 6 or 7 parts of zinc to 94 or 93 parts of copper. It has a reddish color, resembling red gold, and was formerly much used for watches and jewelry. When pale gold became fashionable, the alloy was also changed and it was called oroide; this consists of 10 parts of zinc to 90 of copper. Another alloy which is frequently used as a base for gilded articles is called tombac, and contains from 20 to 30 parts of zinc, and 70 to 80 of copper. Dutch gold, which is used for imitation of gilding, is composed of 14 parts of zinc and 86 of copper. This is malleable, and can be hammered into very thin sheets.

Brass contains 33·3 parts of zinc, to 66·7 parts of copper, varying, however, somewhat from those proportions according to the use that is to be made of it. It has several advantages over pure copper, besides being cheaper. It is much easier to work in the lathe, being harder and not so tough. It will also make perfect castings, which are hard to obtain from pure copper. A little lead is frequently added to brass, as it is not so tough and does not clog the file when containing about one per cent of this metal. Prince metal and mosaic gold are of the same composition as brass.

Ormolu contains equal parts of copper and zinc. Muntz or yellow metal differs from other brass in that it may be rolled when hot; it contains 40 parts of zinc to sixty of copper. The ordinary hard solder for brass may be made by melting two parts of brass with one of zinc.

Sterro metal contains, besides copper and zinc, a little tin and iron; it is very hard and has been proposed as a substitute for yellow metal in sheathing ships. Mallet's brass, which is used for protecting iron from oxidation, contains 254 parts of copper to 746 of zinc.

A Fowl Obstruction.

A late number of the Des Moines (Iowa) *Register* says: "A singular case of railroad obstruction, and one for which no remedy is provided by the statutes, occurred a few evenings since on the Valley road in Green county. Conductor Livingston's train, when about three miles this side of Grand Junction, in passing through some low country and near a pond, ran into an immense flock of swan, brandt, geese, and other wild fowl. The birds were just about to alight on the track as the train drew near. Their number was so great that the sky was filled with them, and those above pressing down on the lower strata forced them to alight on the car tops. The engine, tender and cars were covered with the fowls, and some even clung to the bars of the cowcatcher. One stately swan had a wing injured in the crush, and then found a resting place on the engine head light, whence he was taken by the engineer. The bird, however, managed to escape from custody near Perry, and jumping from the tender where he had been tied, disappeared in the grass. The raid continued several minutes, quite a number of the aerial army being run over by the train, and some half dozen being captured by passengers and train men. As soon as the birds on top of the flock began to understand the situation, they soared away, followed by the entire covey. Livingston says it was the biggest crowd of dead-heads that ever tried to board his train."

GOOD WOODS.—Do not be above your business, no matter what that calling may be, but strive to be the best in that line. He who turns up his nose at his work quarrels with his bread and butter. He is a poor smith who quarrels with his own sparks; there is no shame about any honest calling; don't be afraid of soiling your hands; there is plenty of soap to be had. All trades are good to traders. Above all things avoid laziness. There is plenty to do in this world for every pair of hands, and we must so work that the world will be richer because of our having lived in it.

SHOW me the person who complains of mental weariness, and I will find in him a torpid liver, obstructed kidneys, a dyspeptic stomach, constipated bowels, or an inactive skin. If the brain worker does not sleep enough, nor exercise enough, nor eat enough, or if he eats too much, or takes improper food, his digestive organs run down, and the clockwork of the brain, having no way to reconstruct the machinery through which it receives impressions and transmits volitions and impulses, is obliged to cease work.

The moral is, in brief, keep the body in health, and the brain will take care of itself, work it all you can.—*Dr. Trall.*

THE corporate authorities of Boston have decided to fill up that large portion of useless harbor mud known as the South Boston Flats. Seven hundred acres of valuable land will thus be reclaimed and added to the taxable property of the city, to say nothing of the augmentation of business and business facilities which will attend the consummation of the improvement.

TO light the streets of London, 630,000 gas lights are employed, which consume every twenty-four hours 22,270,000 cubic feet of gas; and if the streets of the metropolis were put together, they would extend a distance of about 4,000 miles.

The Nes Silicon Steel.

Considerable interest has lately been excited by the announcement that a new manner of making steel has been discovered, which, on account of its cheapness and simplicity is likely to cause some great changes in the steel and iron business of this country. This new article is called "Silicon Steel;" and it is claimed for it that it is an entirely new product, differing very materially from any steel heretofore known to commerce. Dr. Charles M. Nes is the discoverer of the remarkable properties of the silicon ore used in the manufacture of this new steel, and the circumstances of his discovery are so romantic that we quote the following account from the *Rome Sentinel* of Jan. 9th:

Dr. Chas. M. Nes, a prominent practicing physician of York, Pa., being called to see a lady who had been struck by lightning, was led to investigate the cause of the attraction of electricity to that particular spot, and found by examination that the electricity had passed down the chimney, thence to a corner of the room where stood a double barreled shot gun, which it had melted down, thence out in the yard to the dog kennel, striking and melting the iron chains with which the dog was secured, and killing him. On examining the melted metal, the doctor was astonished to see the perfect purification and crystalization which had taken place, and conceived the idea of making steel by subjecting the iron while in a molten state to currents of electricity. While thus experimenting, with good results, he was one day hunting on a range of rounded, sloping hills on the Codorous Creek. He shot a pheasant, and stooping to pick it up, discovered a small piece of ore resembling in appearance the melted gun barrel and chain, having the same crystalization and purification. The similarity was so marked that he was led to examine and test its qualities, which he found highly magnetic. He melted some of the ore in a crucible, and ran out a button of very fine steel, which, on being analyzed, was found to be silicon steel, an entirely new product in the steel line, from which the ore derived its name of "Silicon Steel Ore." This led to other and more important experiments, among which was the puddling of 15 or 20 per cent of this ore with common pig iron, in an ordinary puddling furnace. It was surprising to find, as the result, an excellent quality of silicon steel. From that time to the present, he, together with several other scientific and practical men, has thoroughly investigated the whole subject, until it has become clearly and unmistakably established that the mixture of this silicon ore with common iron will produce a quality of steel superior to any in the known world, and at an expense only a trifle above ordinary iron.

Having read the above and some other accounts of the discovery of Dr. Nes, we went a few days ago, to Rome, N. Y., where "The Nes Silicon Steel Co." have established the manufacture of the steel for the express purpose of exhibiting the process, and spent several hours in examining the works and methods. Mr. E. Gulick, the manager, extended to us every facility in his power for informing ourselves, and gave us samples of the ore and manufactured products.

The process of working is briefly this: The silicon ore is first crushed into a coarse powder, then put through a refining furnace, where it is melted and run off into plates of hard metal an inch or two in thickness. Then certain proportions of this hard metal are put into an ordinary puddling furnace with common pig iron, and the whole melted. The silicon makes a very excellent flux in itself, and when this mixture has cooked long enough it "balls up," and is hammered into short square "blooms" under a steam hammer. By using from 3 to 8 per cent of silicon ore with common pig, the iron is merely purified; but if the silicon ore is increased to 15 or 20 per cent, the product is found to be steel of good quality. The "blooms" from the steam hammer can be rolled or hammered into any desired shape. The simplicity of the process is really astonishing. You have but to melt up your materials in certain proportions in any furnace, crucible, or pot you choose, and hammer out a good steel product. None of the expensive special fixtures required in making other steels are needed in making the "Silicon."

We brought home a sample of the refined iron made by this process, and also a piece of the steel. The iron (1 in. diameter, round) we bent double when cold without making a crack on the outside of the bend. It has a fine grain and finishes nicely. Of the steel, we made a "cold chisel." It tempered well, and holds its edge very well indeed. We shall test it further as to its fitness for springs, fine tools, etc. One peculiar property claimed for this steel is that, when polished, it will not rust. The silicon steel has already been tried as a cap to rails. There are said to be now ten thousand tuns of these rails in use on the Erie railway, and thus far with good results. Although the discovery and its consequent enterprises are too young yet to have determined their real worth compared with the old methods, still we are favorably impressed by it and have considerable faith that it will help us in the future.—*Oneida Circular.*

NEW VARIETY OF CUCUMBER.—In *Land and Water* we have a figure and description of what is called the new white spine cucumber. This, when raised on a trellis, grows to an enormous size, one vine having three specimens, each of them three feet in length, besides many others over two feet long. The flesh is said to be very solid, with but few seeds, and the flavor very fine. This method of growing cucumbers is recommended as furnishing a much superior result to that of allowing them to trail on the ground, as they thus grow finer, straighter, and with a larger yield. This new cucumber has the skin perfectly smooth. It is very short in the neck, and it is considered a decided gain to the resources of the vegetable gardener.

Krigar's Cupola Furnace.

Smelting iron in a cupola furnace appears to most people, who see it daily done at every foundery, the simplest thing in the world; it is, however, not so, if due regard is taken to economy and good quality in casting. In a common cylindrical cupola, three essential parts may be distinguished. The upper half or body of the furnace prepares the pig iron and lime which, together with coke, are thrown in at the top for smelting in the middle part or crucible, which is somewhat narrower and provided with numerous nozzles for the introduction of blast, whence the molten iron, together with slag, runs down to the lower part, or hearth, where it collects until it is tapped. When such a furnace is to be started, it is filled to about two thirds with coke and one third with coke and iron; fire is then introduced and the blast turned on, when the molten iron collects in the hearth and replaces the coke of the same. Here it necessarily takes up impurities from the coke and impregnates the latter so much that it cannot be destroyed by the blast; and when the iron is tapped, masses of coke and half melted iron, which are not any longer supported, tumble down in the hearth where they are imperfectly burnt or melted, and cause the iron which collects there to become cold and sticky. These irregularities take place after every tap, and it generally happens that iron, which was at first fluid and gray, suddenly becomes thick and white, and unsuitable for the castings intended. In order to avoid this, Henry Krigar, of Berlin, constructs his cupola so that the lower part, or hearth, is not below the crucible, but by its side, and connected with it by a slanting canal, which is about 3 in. high, 6 to 8 in. long, and as wide as the cupola. This arrangement prevents any coke or half melted iron from falling down in the hearth, which is only accessible to melted iron and slag, and forms for them a kind of sump or receiver, which in no way interferes with the regular working of the two upper parts of the cupola. This very simple construction has proved highly successful, and its great advantages are a saving of fuel, a uniformly hot and liquid iron, and an increased yield per diem, as the regular smelting operation is never interrupted. Kregar's cupola can, therefore, be recommended not only to founderies, but also to Bessemer works, and to such forges as use the Danks puddling furnace with liquid iron, as a uniform heat and quality of each charge are essential for their success.—*Engineering.*

Carbonic Acid.

It is often stated as one of the wonders of plant life, that plants are ablo to do what the chemist has failed to do, that is, to decompose carbonic acid.

While it is extremely difficult to decompose carbonic acid, completely separating it into carbon and oxygen, nevertheless it is quite easy to partially decompose it. If we pass a stream of the gas through a tube containing red hot coals, the coals are burnt at the expense of half the oxygen contained in the carbonic acid, and carbonic oxide is the result. Hydrogen, iron, and zinc act similarly towards it, abstracting half its oxygen.

Potassium burns in it with a red light, producing carbon and carbonate of potassium. This experiment may very readily be shown to a class by taking a tube about three fourths of an inch in diameter and ten inches long, bent at right angles near the upper end, which is sealed in the lamp. A piece of potassium about the size of a pea is introduced into the tube, which has been previously filled with dry carbonic acid over mercury, as all aqueous vapors must be avoided; by inverting the tube, the potassium is lodged in the upper end of the bent portion. If it is now heated by a lamp, the first action is to expel a portion of the carbonic acid from the tube; as soon, however, as the potassium approaches a red heat, it takes fire and burns vividly, completely absorbing the carbonic acid, if it is present in sufficient quantity. Sodium also decomposes carbonic acid, but without taking fire. In the presence of the alkalies at red heat, phosphorus and boron have the same action.

Canned Fruits.

The impression prevails among those who use freely fruits which are put up in tin cans, that they are injured thereby, and this impression is in many cases correct. We have long contended that all preserved fruits and vegetables should be stored in glass, and that no metal of any kind should be brought in contact with them. All fruits contain more or less of vegetable acids, and others that are highly corrosive are often formed by fermentation, and the metallic vessels are considerably acted upon. Tin cans are held together by solder, an alloy into which lead enters largely. This metal is easily corroded by vegetable acids, and poisonous salts are formed. Undoubtedly many persons are greatly injured by eating tomatoes, peaches, etc., which have been placed in tin cans, and we advise all our friends who contemplate putting up fruits the present summer to use only glass jars for the purpose.—*Boston Journal of Chemistry.*

INFLUENCE OF FOOD UPON POULTRY AND EGGS.—The influence of the food of poultry upon the quality and flavor of their flesh and eggs has not generally been taken into consideration; but it is now well ascertained that great care should be exercised in regard to this matter. In some instances, it has been attempted to feed poultry on a large scale in France on horseflesh, and, although they devour this substance, very greedily, it has been found to give them a very unpleasant savor. The best fattening material for chickens is said to be Indian cornmeal and milk; and certain large poultry establishments in France use this entirely, to the advantage both of the flesh and of the eggs.

Official List of Patents.

In consequence of the holiday at the Patent Office on Decoration Day, the list of patents dated May 28th, had not reached us at time of going to press. It will appear in our next issue.

TIN IN NEW SOUTH WALES.—Tin has been discovered in the northern portion of New South Wales. The localities in which deposits have been discovered are at present confined to the Macintyre river, where deposits of ore, mixed with alluvium and of stream tin, have been struck over an area of 10 miles by 12, and to the Oban district, on the first fall from the high table land of New England down to the Clarence river. In the latter locality, it has been almost exclusively stream tin which has been hit upon.

TELEGRAPH BETWEEN SCOTLAND AND CANADA *viâ* ICELAND.—The Danish war steamer *Fylla*, which sailed some days ago from Copenhagen for the Faroe Islands and Iceland, has been ordered by the Danish Government to take soundings and survey landing places for the submarine telegraph line intended to connect Scotland, *viâ* those islands, with Canada.

ERRATUM.—On page 322, current volume (No. 21), we described the proprietor of Motz' expansive pivot as Michael M. Motz, Woodward, Center county, Pa. It should be Mitchell & Motz, at the same address.

Notes & Queries.

[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]

1.—RECOVERING SILVER FROM WASTE SOLUTIONS.—I wish to know a practical method of reclaiming the silver from photographers waste, which consists of paper and the water from washings. I want to get it so that I can convert it into the nitrate.—C. O.

2.—TAPER STEEL RODS.—Will some one tell me the best and cheapest way to make round tapering spring steel rods, three feet long, diameters at ends three thirty-seconds and six thirty-seconds of an inch?—A. B. K.

3.—LIQUID FUEL.—Is there any kind of liquid fuel in use, by which I could make steam for a two horse engine?—J. B.

4.—ECCENTRIC WHISKERS.—What is the cause, or what will prevent, whiskers breaking off where they appear to eat through and turn white at the ends as if they had been singed?—A. S. R.

5.—PHOSPHORESCENT OIL.—Will some one inform me if there is any means of rendering oil or any other fluid permanently and continuously phosphorescent, if it is, at the same time, sealed air tight? If the phosphorescence would continue six months or a year, it would answer my purpose; but it must not require agitation or a heat of above 95° Fahr. to produce it.—H. W. B.

6.—PROPAGATION OF ROSES.—Will some one inform me if, by taking a hardy rose bush and budding other hardy varieties to it, it will prove a success? I should like to know how it is done, and the best time to do it.—B.

7.—MITRAILLEUR.—In Luttrell's "Diary," under date January 1690, mention is made of an expedition being fitted out against Ireland, and amongst the munitions taken are "four of the new invented wheel engines which discharge 150 musquet balls at once, and, turning the wheel, as many more; they are very serviceable to guard a passe." Does history repeat itself in this instance, and is this the forerunner of the Gatling and mitrailleur guns of all kinds?—S.

8.—CONDENSER WITH RHUMKORFF COIL.—How is a condenser connected with a Rhumkorff coil? As I understand it, I connected the opposite coats of the condenser with the opposite sides of the contact breaker. It increases the spark, but I cannot keep the break working. It will stop after a few vibrations and requires an impulse with the finger to start it and soon stops again. When the condenser is not connected, the brake operates perfectly. The contact points are tipped with platinum. I tried gold tips with the same success. The coil I made myself. I use five or six Grove's cells for battery.—S. G. S.

9.—TRANSFERRING MOTION.—I wish to run a small circular saw (24 inch) with a turbine water wheel. Is there any objection to putting a drum on the vertical wheel shaft and running a half twist belt from it to a horizontal shaft from which to drive the saw, instead of using cog wheels to turn the angle?—W. F. W.

10.—ACTION OF RUNNING WATER ON LEAD PIPE.—The water used for drinking purposes, in my house, is conducted from a spring in the ground through about 1,000 feet of three quarter inch lead pipe. The water is constantly running, and has a fall of about four feet. I wish to know if the water may be poisonous, or if any of the lead is decomposed by the action of the water in flowing through the pipe?—G. G. E.

11.—WATERPROOFING MUSLIN.—How can I make a light muslin tent waterproof without painting or oiling it? I wish to use this tent in all kinds of weather, and wish it to be light, so as to be easily carried.—W. H. J.

12.—FORCE OF FALLING BODIES.—We have a steam hammer weighing exactly three tuns, including piston and rod; the stroke is four feet, and the hammer falls by its own gravity. What will be the force of the blow, making no allowance for friction? What is the formula for the calculation?—J. E.

13.—SPECTACLES.—Can any of your readers inform me if there is any article in use that is better suited to the human eyes than spectacles, and if the articles called "eye sharpeners" have proved a success or not?—J. Y.