FOREIGN SCIENTIFIC INTELLIGENCE.

IRON PYRITES CONTAINING SILVER.

A patent has been taken out in England by J. Longmaid for treating pyrites and other ores as follows:—The ores are first ground so as to pass through a sieve having about 100 holes to the square inch. They are then introduced into a furnace where two processes are constantly being carried on with the same heat. The first part of the process consists in the calcining of the pyrites, so as to reduce the sulphur in them to about five per cent; and secondly, the decomposing of these calcined ores by common salt. The ground ores, when first placed in a chamber of the furnace, evolve sulphurous acid, which passes off into another chamber, where it is converted into sulphuric acid by being brought in contact with a proper quantity of oxygen. These calcined ores are now withdrawn, mixed with about five per cent of common salt, then placed in another chamber of the furnace, where they are reduced. After this they are smelted to obtain either the iron, copper, silver or tin which may be in them. This process would be very useful for California pyrites, if fuel were cheap in that State.

CARTRIDGES FOR BREECH LOADERS.

A patent for a cartridge made with gun cotton, covered with a skin of collodion, has been obtained by J. Macintosh, London, England. It is stated to be impervious to moisture; it readily ignites with a percussion cap and leaves no residue after firing. Gun cotton ignites so rapidly that it is very liable to burst a rifle or cannon. Were this not the case, it would be preferable to gunpowder for firearms.

PURIFYING COAL OILS.

A patent has recently been taken out in England by W. R. Bowdich, of Wakefield, for a peculiar method of purifying coal oil. In a proper vessel—called a purifier—he arranges it with a tray on its upper part, which can be heated to a proper temperature. On this tray is placed sifted lime (hydrated peroxyd of iron may be used, but clay is preferred) and pounded clay, and these are slightly raised above the boiling point of the oil. When the purifying material is at the proper temperature, the oils are to be sent into the lower part of, and allowed to pass upwards through the hot purifier, after which they are to be condensed in the usual way. Care must be taken not to send in the oils too rapidly. Care is also required to prevent the tar liberated by this process from passing over with, and becoming absorbed in, the purified oils. The tar will not pass with the purified oils, if the purifying material be not saturated with oil; but it will pass if the purifying material is saturated. It is requisite, therefore, to supply the hot purifier with the coal oil slowly, so that the purifying material may not become saturated. The purified oil will then be of good color. The oil passing from the purifier and through the condenser should be received into a glass vessel at intervals and examined; and, if found colored, the quantity passing through the hot purifier should be lessened. If with a slow current the distilled oil be colored, the hot purifier should be charged with fresh purifying material. The purified oils absorb some part of the gases produced in the process of purification, which gases evolve more odor than the oils have naturally. Such gas may be removed, and the smell of the oils improved by washing them with a solution of caustic soda or potash, and subsequently with water. The quantity of removable matter is so small that a weak solution of alkali is sufficient, and the oils without it are so good that probably the washing will not be thought necessary, except where smell is of great importance. Experience shows that a quantity of heated purifying material, equal to about a fourth of the weight of oil to be purified, gives an excellent result. The claim is for the passing of coal oils through slacked lime, or pounded clay, or hydrated peroxyd of iron, heated above the distilling point of the oils, as described, by which treatment tar and sulphur compounds are removed, and the oils are rendered whiter and free from disagreeable smell.

STEAM NAVIGATION ON ENGLISH CANALS.

It is rather singular that steam navigation on American canals should have been unsuccessful, as described on page 39 of the present volume of the SCIENTIFIC AMERICAN, while in England it has become so successful as to reduce the cost of conveying freight no less than 25 per cent. The Grand Junction Canal Company, which formerly used to tow their boats with horses, have dispensed with animal power, and now use steam alone. There are 5,000 miles of canal in Great Britain, representing a capital of about $200,000,000, and since the adoption of steam as the propelling agent, the traffic increased last year 25,000 tuns. The most peculiar feature in the steamboats which are now employed by the Grand Junction Company plying between London and Birmingham or Manchester, is an improved form of screw propeller, called the "waggle tail," which has the advantage of keeping all the disturbance of the water immediately behind the stern of the boat, instead of spreading it right and left. The effect of this improvement is at once to secure the canal banks from being damaged by the wash and to economize the motive power.

FRENCH RAILROADS.

The French government is reported to be contemplating the purchase of all the railroads in that country. An article in the *Revue des deux Mondes*, in opposition to this centralizing project, points out that the Russian, Austrian and Belgian governments, which all began by constructing railroads, have found it advantageous to get rid of most of them and encourage private enterprise. Already the French government monopolizes "the manufacture of arms, gunpowder, naval architecture, public works, tobacco, salt, the conveyance of private messages by telegraph, the conveyance of small parcels, and controls the management of forests." It is the conservative or rather distrustful system which has caused France to be surpassed in railway extension, not only by England, but by Germany and Belgium. France is in the third rank, as regards the mileage of railroads executed or authorized by decree; in the seventh rank in respect to the amount of her population served by railroads; and in every point inferior as compared with England and Belgium.

As regards commercial facilities and the general industry of the people, Louis Napoleon has been a great patron of the industrial arts. He must beware, however, and not curtail individual effort by adopting a grand centralizing system. The great advancement and prosperity of the United States are principally due to intelligent and general individual effort.

Supposed Cancer Speedily Cured.

The *Dental Cosmos* contains an account of a case by J. L. Suesserot, M.D., relating to an aged lady who had suffered for such a length of time from a large ulcer on the inside of the lower lip that it was at last held to be malignant cancer. The exciting cause of this was the protruding apices of the roots of the central lower incisors which had escaped the notice of the attending physician (a gentleman of acknowledged ability in his profession), because of the coating of tartar, which rendered their appearance very similar to that of the ulcer. Dr. Suesserot says respecting it:—"Prompted by a desire to benefit the patient, and at the same time demonstrate the advantage of a dental education, I was induced to commit the unprofessional act of operating before the invitation was extended. No regular instrument being at hand, I called for a table fork, and, in a much shorter time than the writing of this has consumed, I relieved the greatly distressed patient of a disease which she had expected would very soon terminate her existence. Nearly all of the alveolar margin having been absorbed, by placing a prong of the fork under the protruding lower end of the root, the operation of evulsion was readily performed; and by the removal of that which had become a foreign substance, the diseased condition of the lip, as well as all the surrounding parts, was speedily removed. As this is not an isolated case, it would be well for the cause of humanity were the dentist more frequently called in consultation; the diseases of the teeth and their surroundings being his special province, many morbid changes which too often escape the notice of the physician, or are considered by him of minor importance, might be detected, and disastrous results prevented."

SUBMISSION TO IMPROVEMENTS.—In our time when science and art are making such rapid strides that almost every day startles us with the announcement of a new discovery calculated to annihilate time, or increase the productiveness of labor, mechanics often find themselves encroached upon in their occupation, and instinctively take a stand against the revolution intended. Nothing can be more natural, or, on calm reflection, more completely hopeless. The consequence is inevitable. The mechanic must submit, and expect to receive his reward indirectly and in the course of time.—*Shoe and Leather Reporter.*

AMERICAN NAVAL ARCHITECTURE.

[Reported for the Scientific American.]

THE IRON STEAMSHIP "WM. G. HEWES."

This is one of the largest iron steamships ever built in this country. She was launched on the 15th of December, in the presence of 5,000 people. Her hull was built by Messrs. Harlan, Hollingsworth & Co., of Wilmington, Del. Her machinery was constructed by the Morgan Iron Works, of New York City. The route of her intended service is from New Orleans to Galveston. For strength and beauty of model, this steamer cannot be surpassed. We append full and correct particulars of her hull and machinery:—

Length on deck, 239 feet 4 inches; length at load line, 239 feet; breadth of beam (molded), 33 feet; depth of hold, 10 feet; depth of hold to spar deck, 18 feet; draft of water at load line, 9 feet; area of immersed section at the above draft, 270 square feet; displacement at load line, 1253 tuns; tunnage, $1477\frac{45}{100}$ tuns.

Her frame is of wrought iron bars, 4 inches by 1 inch and 4 inches by $\frac{7}{8}$ of an inch in thickness, which are fastened with keepers $3\frac{1}{2}$ inches by $\frac{3}{8}$ of an inch thick, every 12 inches, together with rivets $\frac{3}{4}$ of an inch in diameter. Distance of frame apart from centers, 16 inches; they are molded 4 inches and sided 1 inch. Number of strakes of plate, from keel to gunwale, 16; thickness of plates, $\frac{1}{2}$ to $\frac{11}{16}$ of an inch. There are 14 cross floors, shaped T; depth of these, 18 inches; thickness, $\frac{9}{16}$ and $\frac{1}{2}$ of an inch, forming belts with angle iron on top, six of them continuing up to guard deck clamp, and the balance to main deck lodger. Shape of keel, U; constructed of double plates, $\frac{5}{8}$ and $\frac{1}{2}$ of an inch in thickness; depth of same, 6 inches. There are 10 fore-and-aft keelsons, 18 inches high and shaped, T; these are capped with angle iron, continuing from end to end.

The *Wm. G. Hewes* is fitted with one vertical beam condensing engine; number of cylinders, one; diameter of same, 50 inches; length of stroke of piston, 11 feet; length of engine room, 76 feet; diameter of water wheels over boards, 30 feet; length of wheel blades, 7 feet 6 inches; width of blades, 7 feet 6 inches; depth of blades, 1 foot 8 inches; number, 26; material, iron; dip of wheels at load line, 6 feet.

She is also supplied with one return tubular boiler, made of steel plates, which is the only one of any size ever constructed in this country. Length of boiler, 21 feet; breadth, 17 feet; hight, exclusive of steam chimney, 9 feet; location, in hold, forward of engine; it has a water bottom. Number of furnaces, 4; breadth of same, 3 feet 6 inches; length of grate bars, 6 feet 8 inches; number of tubes, above, in boiler, 92; number of flues below, 8; internal diameter of tubes above, 5 inches; internal diameter of flues below, 1 foot 7 inches; length of tubes above, 15 feet; length of flues below, 11 feet 4 inches. Diameter of smoke pipe, 68 inches; hight, above grates, 50 feet. The boiler possesses a grate surface of 93 square feet, and a heating surface of 2,600 square feet; consumption of coal, per hour, 1,680 pounds; maximum pressure of steam, 30 pounds, cut-off at one-half stroke; maximum revolutions at this pressure, 18; weight of engines, 190,000 pounds; weight of boiler, with water, 102,690 pounds.

In addition to these essential features, the following deserve attention:—Bunkers are of wood and iron; the vessel is fitted with three anchors, weight, respectively, 2,000, 1,300 and 400 pounds; water ways are of wood; she has three bulkheads, iron braced with angle iron; the water wheels have gunwale bearings; she has one independent steam fire and bilge pump, two bilge pumps, two fire pumps, one bilge injection, and five bottom valves or cocks, arranged as follows:—Two for fire pumps, two for injection pump, and one for steam pump. Ample protection against communication from fire has been made, in the shape of iron, tin, &c., &c.

This steamer is named in honor of the President of the New Orleans, Ohio and Great Western Railroad Company, of New Orleans; she will be commanded by Capt. James Lawless, formerly of the steamship *Orizaba*.

In the furnishing of the steamer, expense has been a secondary consideration; the saloons are of hard wood finish, and fitted up in the most gorgeous style. Credit is justly due to Messrs. Harlan, Hollingsworth & Co. for such a successful and splendid production.

India-Rubber Manufactures.

[Concluded from page 59.]

To return, however, for a time to our own country. The application of india-rubber to waterproof garments by Charles Macintosh was the first practical adaptation on a large scale either here or abroad ; and the immense number which were sold proved fully their appreciation by the public. In 1830, the first attempt at overshoes in this country was made by Thomas Hancock, who took out a patent in that year for a composition for coating linen or cloth, or moulding into shoes. These, however, were a failure for the same reason that all manufactured india-rubber goods had hitherto been found deficient—they would not withstand the action of the atmosphere. There was evidently a goal not yet reached—a grand secret which must be discovered ere success should fully attend the manufacture, or the value of the material be fully proved. Its application, however, to various useful purposes was constantly going on, and both in France and this country, as well as in America, large sums were expended in perfecting machinery for masticating, spreading, and otherwise preparing the gum. One singular application was made, in 1840, by pressing it into blocks combined with sawdust and finely-broken stone, for paving roads. This patent—for it was made the subject of one—we fear did not prove remunerative to the inventor, as it does not seem to have ever been turned to practical account. Several patents were also taken out for cutting india-rubber thread, and applying it woven with silk and cotton to various purposes where elasticity was required—a branch of manufacture which still exists as one of the most successful of its applications.

The year 1843 saw the introduction, however, of the long-sought-for "change," by which the gum was rendered inadhesive and elastic alike under the influence of heat or cold.

The merit of this invention, about which there has been much litigation, is unquestionably due to Charles Goodyear, although a patent was taken out in this country by Thomas Hancock prior to Goodyear's, which bears date two months later. Reasons for this are, however, given in the case of the American, which are fully borne out by facts.

Vulcanization, produced, as is now well known, by the action of sulphur under the influence of heat, ranks amongst the most important discoveries of the present century, and the discoverers have each, in their respective countries, reaped the reward of their labors by large returns received under patents granted to them for the process.

The establishment of the india-rubber manufacture in America, though dating later than that of England, has reached greater perfection, and is more thoroughly understood than in this country. The first manufactory of any consequence was started there in 1832, and was called the Roxbury India-rubber Company, whilst here the first, we believe, was that of Mr. Charles Macintosh, who commenced in the year 1821, more than ten years previous.

Charles Goodyear was born in New Haven, United States, in December, 1800, and for upwards of thirty years was engaged with his father and brothers in the hardware and clock business at Connecticut and Philadelphia. During this time, indeed in his early days, commenced the development of that inquiring and inventive genius which afterwards led to such great results when his attention was turned to india-rubber. Many ingenious and useful inventions in connection with his trade added to the celebrity of the firm, which then held a position as one of the first hardware concerns in the United States. From extended credit and heavy losses, however, the firm were obliged to succumb, and young Goodyear, who had charge of a retail store at Philadelphia in connection with his father's factory, was left, after repeated imprisonments for debt, with no very bright prospects for the future. It was at this time that accident drew his attention to the decomposition of india-rubber goods, and he was told that if any means could be discovered to prevent it, a very large sum of money might be realized by the invention ; the numerous manufactories then existing, and the large sums of money invested, being placed in jeopardy by the goods being thus rendered unsaleable. He immediately turned his attention to this point, and from that time to the day of his recent death, through good and evil report, in wealth and in poverty, in prison or palace, the sick bed or the traveling carriage, he never ceased to give the one point of rendering india-rubber a perfect material his whole attention. The perseverance which induced this deserved success, and in 1839 he was rewarded by the discovery of vulcanization.

His first attempts were commenced in his own cottage, where, with the assistance of a New England wife, who was his only friend through many struggles and depressions, he succeeded in making a few pair of overshoes, as he thought of a superior kind to those made by the companies then in existence ; but, alas ! they proved like the rest, and were destroyed after a short exposure to the air, indeed sooner than those without his "improvement." On looking at his stores, when about to take them into the market, he found them "one mass of melted gum." This was a sad failure, and the furniture of the cottage had to go for the sustenance of his family. Cast down, but not undaunted, he put his family in a boarding-house, and set off for New York to continue his experiments. Here he met with a friend to give him lodging and a chemist who found him his drugs. He went to work again with magnesia and lime, and produced some inadhesive materials, which, though apparently at the time perfection, turned out, like the rest, failures ; though he exhibited and obtained a medal for the improvement at the fair of the American Institute. While experimenting with lime he washed his material with nitric acid to remove the lime from the surface, and discovered what is known as the acid-gas process, which he patented and found of great value. During the winter of 1836–37 he entered into partnership with a Mr. Ballard to make goods on this plan, and they took steam-power in Bank-street, at the same time making arrangements for occupying a large factory on Staten Island that had been already tenanted by a corporation in New York for the manufacture of india-rubber goods, but which, from their inability to surmount the difficulties of the business, had been closed for some time. The mercantile disasters, however, of 1837 included the friend who was to find the capital, and he was left without the means of carrying forward his plans. Again was the little home broken up, and he had to seek the assistance of a brother almost as poorly off as himself. Located on Staten Island, he was allowed admission to the machinery of the closed factory, and there made a few goods to obtain his daily bread. These, though the general lot of inventors, were hard trials to be borne.

The heavy losses which had been incurred by all who had invested in india-rubber "stock" made it utterly impossible to induce any one to assist him. He found the same state of things at Boston, and, taking some of his specimens to Roxbury, Mass., he found no better encouragement there, that company having entirely abandoned the manufacture. He here, however, also obtained access to the machinery, and still went on struggling for success. In 1838 his attention was first drawn to the use of sulphur by Mr. Hayward, a gentleman connected with one of the india-rubber companies, who was using his solvent impregnated with it as a dryer. Goodyear's notice being thus drawn to it, and seeing a value in it which Hayward did not, he purchased the patent which had been taken out at his suggestion, and which simply claimed the using of sulphur as described, neither party having any idea of vulcanization afterward discovered by Goodyear.

During this time he issued several licenses for working under his acid-gas and solarizing process, which was thought a great improvement, and which brought him in a few thousand dollars. His fortunes seemed in the ascendant, and he manufactured large quantities of fancy articles, and obtained an order from the government for a number of mail-bags. With all the goods he was now making he mixed large quantities of pigments—chromes, white lead, and vermilion—but without chemical knowledge, he was ignorant of the effect of these metallic colors on the india-rubber after undergoing his acid-gas process, and the result was, that the whole proved a ruinous failure, all the goods decomposing within a short time after their completion. Everything he possessed was again brought to the hammer, and his aged parents, whom he had been for some time supporting, together with his own family and two younger brothers, were left penniless. Four years had been spent in experiments, all of which had proved fruitless, and it was generally agreed by those who had hitherto assisted him "that the man who could proceed further in a course of this sort was fairly deserving of all the distress brought upon himself." No hope could be looked for in that quarter. The only advice he got was to return to the hardware business ; even his licensees, discouraged by their failures, would not grant him any assistance. The india-rubber trade in the United States was at its lowest ebb, the ruinous losses which had fallen upon those who had invested their money in it making it a public calamity. He had, however, made it his leading star, and no persuasions could make him give it up. Reduced to poverty and the pawn-shop, he is described as being recognizable "as a man who has on an india-rubber cap, stock, coat, vest, and shoes, with an india-rubber purse without a cent of money in it"—an encouraging picture for those to whom he applies for help. But fortune was in store for him. One day accidentally bringing a portion of rubber mixed with sulphur, which he had in his hand, in contact with a hot stove, he found that it had undergone a change such as he had not before noticed, and following up the experiment for some months alone in the factory at Woburn, he discovered the process which makes it proof against cold, and the usual solvents, and, as he himself says, he felt amply repaid for the past, and quite indifferent as to the trials of the future. Perseverance had met with its reward, and the future, though not bright at first, and often clouded over by trouble, eventually bore out his hopes to their fullest extent. Not to follow too closely his chequered career, we may here state that although he at once patented his invention, two years elapsed before he could get any one to assist him in bringing it before the public, such was the general aversion to any more experiments with what had hitherto proved so disastrous a failure—a state of things so unfavorable to the promulgation of the discovery as can well be imagined. The interval was occupied by making various improvements, life being sustained by means of diverse loans of five and ten dollars, presents of barrels of flour from sympathizing friends, pawning even his children's school-books, and other shifts with which poverty is familiar. He felt he had now, however, grounds of assurance which had never existed with regard to previous improvements. The discovery was made in winter, and the specimens did not harden. Summer returned and they did not soften by heat.

Swallowing Indigestible Substances.

Dr. Read exhibited at the Boston Society for Medical Improvement, a quantity of stones varying in size from that of a pea to that of a cherry, which had passed through the intestinal canal of a boy seven years old. Having seen one of the performers at a circus swallow, or pretend to swallow stones, he resolved to follow his example, and in the course of one afternoon he swallowed *sixty-four*, the united weight of which was a little more than nine ounces, and which filled an eight ounce bottle.

On the next day the stones could be felt through the walls of the abdomen, and, upon percussion, could be heard to rattle, but produced no inconvenience. Castor oil was administered, and they were readily expelled.

At the same meeting, the proceedings of which are reported in the *Boston Medical and Surgical Journal*, Dr. Tyler said that it was a common thing for patients at the McLean Insane Asylum, to swallow small objects, such as pieces of glass, coal, stone, thimbles, &c. Recently a woman swallowed a crochet needle which was voided without inconvenience. Among some of the patients was a curious propensity to swallow toads, and there is now in the Asylum a man who has swallowed half a dozen live toads without injury.

Dr. Adams stated, that in a case of obstruction of the bowel, which followed the eating of a large quantity of cherries and swallowing the stones, the nurse collected and counted *one thousand and seventy-seven* cherry stones which were evacuated.

Dr. Agnew, of this city, has in his private collection a preparation of the stomach and intestines from an insane patient, in which are accumulated an extraordinary variety of foreign materials, among which we recollect having seen long strips of bandage, suspenders, portions of clothing, buttons, &c.

A SOLID cake of gold, worth nearly $50,000, has been sold to the Bank of New South Wales, and the quartz reef from which it was obtained will produce $150,000 a year for many years to come.