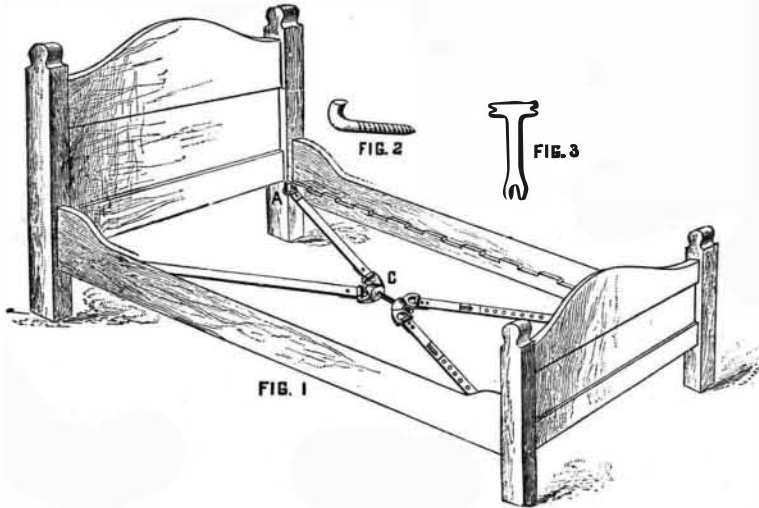


AN IMPROVED BRACE FOR BEDSTEADS.

A brace for strengthening bedsteads and holding the posts securely in place, and one readily applicable to old as well as new bedsteads, is illustrated herewith, and has been patented by Mr. Charles P. Lewis, of Sweet Springs, W. Va. The head and foot posts are each provided with a hook, A, on the inside, below the notched railing in which the slats are held, and to these hooks are attached the outer ends of bands fastened at their inner ends on the head, C, in which a threaded bolt is held to turn loosely, the bands being thus stretched and drawn very tight by means of a wrench. The bands are made adjustable, so as to fit



LEWIS' BED BRACE AND TIGHTENER.

the brace to bedsteads of different lengths, the two bands at one end having locking ferrules adapted to be locked by a pin fitting apertures in the bands. By this means the bedstead, besides being tightened in other ways, is made particularly rigid and strong laterally, and well braced against strains of moving.

THE NEW SPANISH STEAMER ALPHONSO XII.

The Alphonso XII. is a new ship, of which we give an engraving from *La Ilustracion Espanola*, lately built at Newcastle for the Transatlantic Company, of Spain. Her principal dimensions are: Length, 426 ft.; width, 48 ft.; depth, 33 ft.; draught, 24 ft.; displacement, 8,400 tons; indicated horse power, 5,000. She is one of the finest mercantile ships afloat—in fact, a veritable palace. As to interior decoration and furnishings, everything possible has been done for the comfort and entertainment of passengers. In the ornamentation there is a lavish use of marbles, bronzes, and costly woods. Taste and richness have been well combined. The most beautiful representations of the pictorial art, by notable living artists, adorn the inte-

riors. Libraries of books, magazines, and newspapers attract the reader. Spacious, well ventilated cabins are provided. Baths, electric lights, abundance of life preserving apparatus, and every appliance for convenience and safety are supplied.

Our particular object in this article is to call attention to the rapid and successful manner in which Spain is building up and extending her foreign commerce, with the hope that our own countrymen may be encouraged to do something in the same direction. If there is one thing more than another that our people at present desire to see realized, it is the re-establishment, on a broad and permanent basis, of our foreign commerce. This can only be done through the medium of home-built steamships of such superior construction and speed that the flag of the Great Republic may be worthily displayed in all the principal ports of the world. Nothing is more easy of accomplishment, and yet our legislators, upon whom the matter depends, have done nothing but talk upon the subject for the past twenty years. If we want a share in foreign commerce, we must do as other nations are doing, as England, Germany, France, are doing, namely, grant liberal subsidies for the purpose. This has been the fixed policy of Great Britain ever since the commencement of ocean steam navigation, and, as a result, her steamers visit every quarter of the globe, and she enjoys the trade of the world. Within a few days past, subsidies to the extent of sixty-five thousand dol-

lars a year for several years have been agreed upon for a line of steamers from Vancouver, the terminus of the Canadian Pacific Railway, to China and Japan, for twelve trips a year.

Within the past three years the Spanish government, by offering the stimulus of subsidies, has established several new lines of splendid steamers. Spain now has a noble lot of vessels plying between New York, Cuba, Mexico, and West Indian ports. On the Pacific she has a new line of steamships that regularly traverse the coasts of South and Central America. Her fleets of passenger ships sailing from her home ports to Cuba, to Manila, to Brazil, to the Argentine Confederation, and other parts, comprise some of the finest of vessels, and her commerce is rapidly growing in importance.

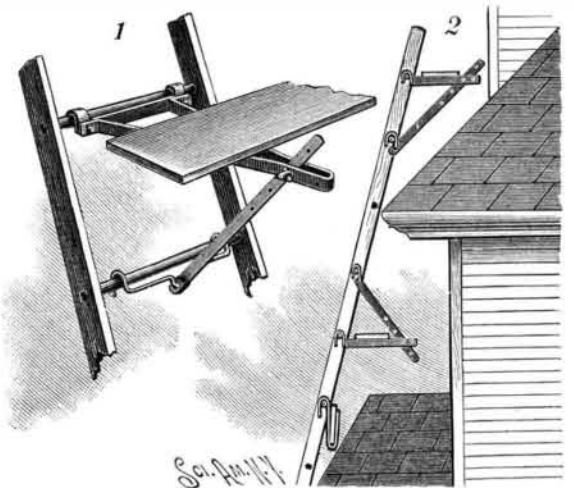
Electric Prostration.

Several cases of this new malady are reported from Creusot, France. It affects workers under electric light. The light exceeds 100,000 candle power, and it appears that it is this excess of light, and not the heat,

which produces the nervous symptoms. A painful sensation in the throat, face, and temples is first noticed, then the skin becomes coppery red, and irritation is felt about the eyes, much lachrymation ensues, and these symptoms then disappear, while the skin peels off in five days. The effects are comparable to those produced by walking over fresh snow in the sunlight, and may be regarded as a sort of "sun-burning."—*Lancet.*

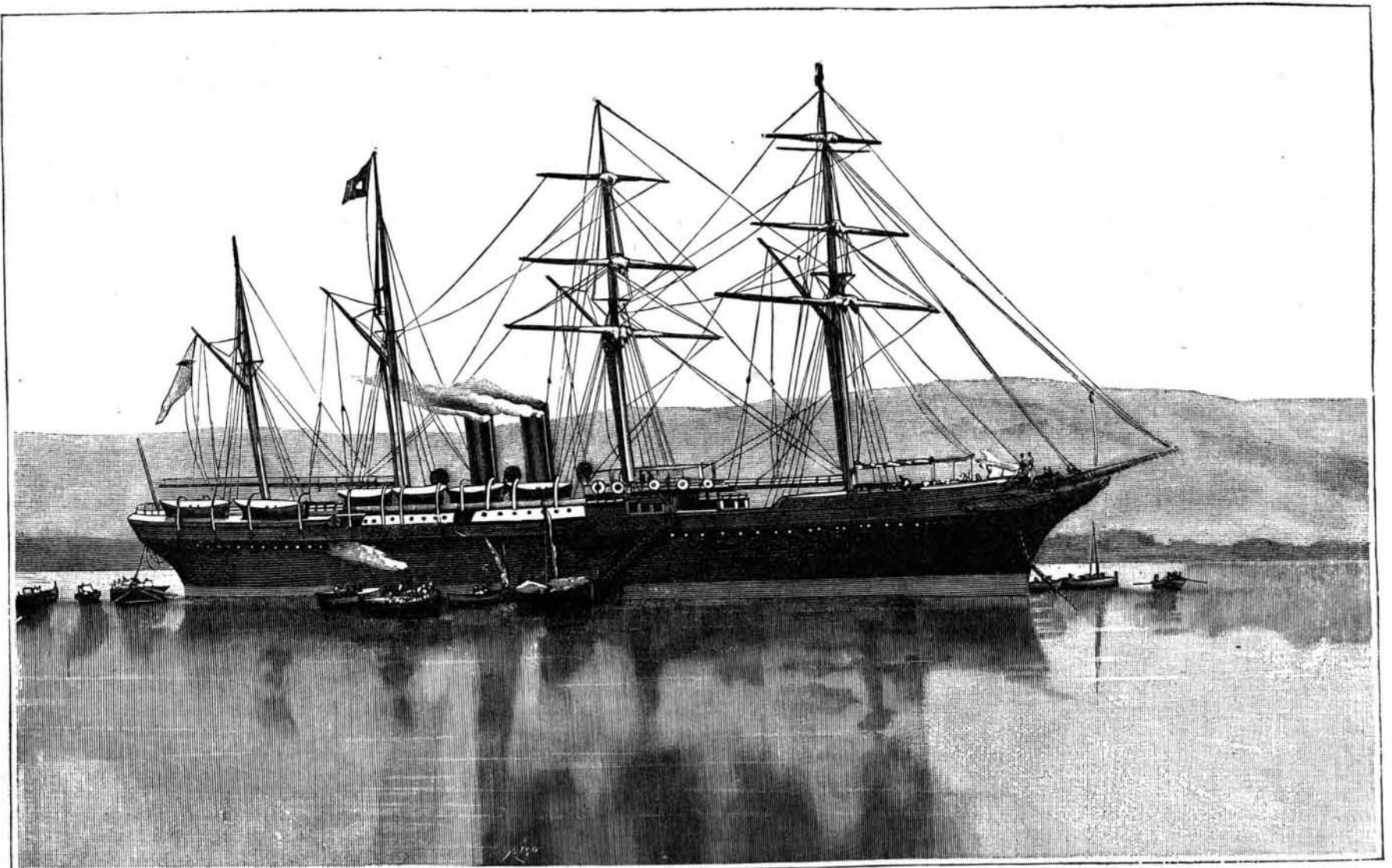
AN IMPROVED SCAFFOLD BRACKET.

A bracket which can be easily and quickly adjusted at any desired angle to a ladder, for supporting scaffolding, and one which is cheap and durable, is shown



LONG'S SCAFFOLD BRACKET

herewith, and has been patented by Mr. James A. Long, of Spokane Falls, Washington Ter. The horizontal brace for supporting the boards of the scaffold is made of flat iron, in an approximately V shape, as shown in Fig. 1, the free ends of the arms of the brace having offsets to which are secured iron hooks that partly encircle the rounds of the ladder. The outer portion of the horizontal brace has a space, outside the scaffold boards, for a running brace rod, both portions having perforations by which the brace rod may be locked by a bolt to the horizontal brace, the other end of the brace rod being adapted to engagement with a round of the ladder by means of a hooked clip. This bracket can be located at any part of the ladder, as may be required for working on different parts of a house, as shown in Fig. 2, the running brace being attached to the round above or below that engaged by the horizontal brace, as may be most convenient for the workmen. Double-hooked holders are provided to support the boards from the ladder while the brackets are being readjusted in changing the position of the scaffold.



THE NEW SPANISH PASSENGER STEAMER ALPHONSO XII.

The Ingenuity of Smugglers.

A short time ago the customs authorities made a seizure of a considerable quantity of tobacco concealed in bales described as cotton waste, but in which cotton only played a secondary, although somewhat important, part so far as the smugglers were concerned. In another case a box supposed to contain fish was found to be lined with a much more valuable commodity in the shape of contraband tobacco; while, in the third instance, a sailor's accordion, although unwilling to discourse sweet music to the touch of a customs official, was, nevertheless, quite willing to disclose to his eager gaze its full contents of cigars. These are certainly very old dodges, but they lack the danger and excitement usually associated with the doings of the smuggler of the past, and which made that individual quite a recognized hero. Since the days of Ethelred, when customs duties were first levied, every conceivable device has been practiced in order to avoid payment of those duties, and, undoubtedly, so long as duties are imposed attempts will be made to defraud the revenue.

Toward the close of last century smuggling was very rife, and many a valuable cargo of contraband goods was successfully "run" and disposed of, realizing a handsome profit for the contrabandist. At that time, however, a far larger number of articles were taxed than at the present day (in fact, a hundred years ago no fewer than 1,425 articles were liable to duty), and this, of course, greatly increased the temptation to smuggle. Nowadays smuggling is almost exclusively confined to small quantities concealed on board our steamships, but even in effecting these concealments the smuggler exercises great cunning, and does his utmost to outwit the customs "rummager."

About a century ago it was no uncommon thing to find a vessel fitted with false bows or stern, a hollow keel, or with the spare masts, spars, and oars which she carried composed of tin, but painted to resemble wood, the cavities being utilized for the concealment of dutiable articles. Logs of timber were also hollowed out and employed for a similar purpose. Many a cask of spirits has been towed under the bottom of a vessel, a fear existing that a revenue cruiser might board the smuggler and discover the casks were they carried in the hold. When it was necessary to get them ashore they were weighted and kept under water, a mark being set as to their whereabouts, so that they could be taken away at a favorable opportunity. Another ingenious artifice, practiced on the East coast, was to cover casks of spirits with a kind of cement, and attach some seaweed thereto, which gave them the appearance of rocks, and then cast them on the bowlders ashore, from whence they were ultimately removed. Ships' carpenters have been known to smuggle spirits and tobacco in what passed for a pot of pitch, and a presumably studious individual, who frequently left his vessel with a book under his arm, carried in it a tin case containing spirits in order to avoid payment of duty.

Tobacco appears to have generally been the favorite object of the smuggler, and he still devotes his close attention to its importation. It has been frequently made up into ships' fenders or into cordage of all shapes and sizes, and brought ashore as such; while the wheels of some of the blocks in the running gear have been found to be made of Cavendish tobacco instead of iron. It has also been introduced into casks of pitch and casks of various kinds of seeds. False bottoms have been added to dog kennels, hen coops, drawers, chests, etc., in order to make these innocent-looking articles the receptacles of contraband goods. Tin cases, containing tobacco or cigars, have often been discovered in the water tanks and in the casks of spirits and oil carried by vessels. Wooden fenders hanging over a ship's side have been hollowed out and the cavity filled with tobacco. In many cases, too, it has been dropped between the outside plank and "skin" of a vessel, and concealed in water closets and other unsavory parts of the ship.

Bladders containing spirits have been secreted about the body, and tobacco and cigars have been brought ashore in like manner. Female smugglers had petticoats specially prepared for the introduction of tobacco, cigars, and spirits, the former being concealed in small pockets adapted to the purpose. When duties were levied on silks and lace, large quantities of these goods were imported without the cognizance of the customs authorities. These were the favorite articles of the female contrabandists; and by them many a package of costly silk and lace has been brought into the country. Vessels from France have been found attempting to import lace made up in boxes in the shape of apples, and so painted as to pass for fruit. Silks and lace were also frequently found in loaves of bread, and tobacco, on many occasions, has found its way into the same place of concealment, in fact, a large quantity so concealed was recently seized at Hull. When foreign watches were subjected to duty, many a gentleman's great coat has had for once a "silver lining," the smuggler attempting, by its assistance, to elude the vigilance of the customs officials. Snuff has been made into cakes and imported as oil cake, a considerable quantity being landed before the fraud was discovered.

On the abolition of the duties on coals, many of the

colliers on the coast were engaged in the illicit trade. The *modus operandi* of these vessels was to obtain a part cargo at one of the coal ports, and, subsequently, at a point previously agreed upon, load a quantity of tobacco or spirits from a smuggler. Some of these vessels succeeded in making very profitable voyages in this manner.

An ingenious mode of concealment was disclosed in 1881, and a large seizure of contraband goods was the result. From "information received," the customs authorities sent a detective to Rotterdam, and he there discovered that boilers, evidently made for the purpose, and quite unfit for anything else, were being made the means of importing large quantities of tobacco into this country. Some time after arriving in England the boilers and smugglers were seized, and the latter mulcted in the penalty of £4,824. The tobacco seized on this occasion weighed five tons.—*Nautical Magazine*.

Steam Jet Phenomena.

Herr R. Von Helmholtz has sent to *Wiedemann's Annalen* some observations made by himself upon a jet of steam. He remarks that a jet of steam escaping from a hole of one or two millimeters diameter, lighted obliquely and observed upon a black background, is invisible at the lower extremity, and presents toward the top the well known whitish appearance. This aspect may be modified in many ways. If an electrified point is brought near the steam, the jet immediately becomes azure blue, or, according to the power of the electrical machine, purple, red, yellow, green, etc. These tints are intimately connected with the dimensions of the liquid drops, and hence it follows that the electrical point has the power of provoking condensation of the supersaturated vapor which is found at the lower part of the jet. The same result is obtained by bringing near to the steam jet a platinum wire made brightly incandescent by an electrical current, or silver, iron, copper, or brass wires simply made red hot in a flame, or even glass heated below the red, or an organic matter, wood, paper, etc., in a state of slow combustion. The products of any flame whatever, with the exception of the flame of pure alcohol, directed upon the jet of steam by the aid of a chimney or by simple blowing, produce a very energetic effect. Finally, traces of certain chemical substances introduced into the steam jet cause the same modification. Among these are hydrochloric and nitric acid, but concentrated sulphuric acid especially shows the phenomenon. It is known that solid dust particles provoke the condensation of supersaturated vapors, but their presence cannot be invoked here to explain the preceding facts.

The author is of opinion that they may be attributed to a molecular concussion, the effect of which may be compared to that of mechanical concussion upon superheated or supersaturated liquids. A flame, for example, is the scene of closely approximated and extremely varied movements, and the chemical atoms which are incessantly passing in it from one combination to another are found in every kind of unstable condition. These movements and changeable states of equilibrium leave their traces in the products of combustion at a certain distance from the flame properly so called, and determine the observed phenomena. The luminous effect produced at the extremity of an electrified point and the presence of ozone in its vicinity show that this point is the cause of concussions comparable to those provoked by active combustion, and the analogy between the two phenomena is found again in the fact that they both furnish means for making electricity pass through gas. As to solid incandescent bodies, they can act either through the emission of solid particles from their surfaces or by the chemical concussions which they communicate to the surrounding gases.

The Cost of Electric Street Lighting.

The following figures of the charges for lighting streets with arc lamps are of interest. They have been quoted from a communication of the Boston Citizens' Association, which was addressed to the Board of Aldermen of that city for the purpose of showing that Boston is overcharged for this service. For New York, the average price is given as 34½ cents per lamp for one night's service. Brooklyn pays 55 cents, Buffalo 45 cents, New Orleans 34 cents, Philadelphia 50 cents (average), and Baltimore 50 cents. Boston pays 65 cents. The Citizens' Association of Boston claim that on the 695 lights used in their city the reduction in cost of carbons from the figures of 1882 represents 25 cents per lamp for each night, an aggregate of about \$60,000 per annum. The price of carbons in the last six years has fallen to less than one-third the original price. Yet Boston is now paying the same rate paid in 1882—65 cents per lamp. In 1887 the service cost \$131,097.97. All of this, except \$11,299.54, was received by one company. It seems very clear that Boston needs a little healthful competition. It is interesting to notice how important a factor carbons are in the cost of electric arc lamps. It seems like hoping for an impossibility to think of indestructible electrodes being possible, yet until some advance in that direction shall have been made, the electric light will be far from perfect.

The Inventors' Institute, London.

The present session of the Inventors' Institute was opened on October 24, when Admiral Selwyn, vice-president, delivered an address on subjects of importance in relation to the patent laws. The general union of inventors had been, he said, for many years persistently sought by the council in spite of many difficulties. How far the interests of inventors will be affected by the changes the patent agents are seeking to establish, it will be the business of the council to investigate. That there should be a registration of patent agents no one doubts, and that measures should be taken to punish those who behave badly is reasonable enough. It requires merely that the punishment should be defined by the state. What inventors want, and what would instantly benefit the state, is a simplification of the law, a reduction of the fees, an extension of time, and, above all, security of title for patents. So strongly is this latter requirement felt to be essential in the United States that there have been during the present year several cases decided by the Supreme Court in which the infringers have been held liable not only for the damages claimed by the patentee, but also for the mesne profits made during the whole period of infringement. It has also been decided that, even when no patent has been taken, but the invention has been worked, there is a proprietary right, and that those who obtain the secret by corrupting workmen or otherwise fraudulently are liable to an action for damages. This is the consecration of a principle asserted at the congress of Paris in 1878, in the following language: "The right of inventors in their works is a right of property. The civil law does not create it, but only regulates it." The United States have been the first to see its justice and policy.

As an instance of the serious detriments which may accrue to a state from unwillingness or incapacity to examine into and appreciate the value of inventions, the vice-president referred to the case, recently become publicly known, of Mr. Longridge, who, in 1855, demonstrated mathematically the value of wire in the construction of artillery, as a means of making a strong gun cheaply and quickly. In 1860 he made such a gun; but still in 1875 he was told that his proposals had been carefully examined, but that they were not applicable to Her Majesty's service. In the present year (1888) General Maitland has publicly stated that a gun has been made at Woolwich on Mr. Longridge's plan which has distanced all competitors, and thrown a shot 12½ miles at an initial velocity of 2,300 feet per second. We may assume, therefore, as some £5,000,000 has been annually spent during the past thirty-three years on guns, forts, powder, and armored ships, that £175,000,000 expenditure has been rendered nugatory by this suppression or ignoring of an invention. The sole consolation to be found in this case is that the expenditure has taken place in our own country. It will also be seen that in this case there is evidence of the insufficiency of time during which in England a patent is sustained.

The present year bids fair to eclipse its predecessors in the number of patents applied for, there being 14,500 to date. In fixing the taxes on patents, the legislator seems to have lost sight of the fact, so often insisted on here, that income is created by every successful invention, and that such income then pays taxes far in excess of the amount the inventor is called upon to pay as fees. The philanthropist seeks to remedy poverty by taxing the rich, forgetful that the rich are the best employers and paymasters of the poor. The visionary advocates division of riches; but the mission of the inventor is to increase wealth in proportion as his inventions provide honest labor with profitable wages. That no inventor may imagine there is neglect or idleness in this Institute, Admiral Selwyn remarked that it had urged the views entertained by the council on the committee of the Board of Trade by personal attendances during the present year, but as only one question had been officially brought forward, namely, the practice and organization of the Patent Office, there has been no opportunity of urging so much as they would have wished. The true remedy for the evils still existing in the patent law, and in the practices of the courts, agents, and offices, is the simplification of the law. Nothing but the strictest union among inventors can move members of Parliament to assist our united action. In conclusion, the Admiral explained the advantages which the American law offers to the citizens of other countries for taking out in the United States the first patents for their inventions.

Preservation of Meat.

The *Journal d'Agriculture* states that it is customary in Upper Saone (France), both on farms and in villages, to preserve meat in summer by placing it in large earthen pans or pots filled with curdled milk, or even with skimmed milk, which soon curdles, and storing the vessels in the cellar. In order to keep the meat beneath the surface of the milk, it is loaded with clean stones. Meat is preserved in this way for over a week, without the least change in its flavor. When it is needed for use, it is simply washed and dried. The milk is fed to swine.

The Confederate Cruiser Shenandoah.

The way the British assisted the Confederates during the late war of the rebellion is thus briefly described by the London *Engineer*. Referring to the naval exhibits now in the Glasgow exhibition, our contemporary says:

The Clyde, in 1860, was the first iron ship built for Messrs. Somes Bros., of London, whose East India fleet is well remembered as perhaps the most notable of that time.

Next to the John Lidgett, already referred to, was a model of a vessel which recalls the stirring maritime events of the American civil war. The vessel it represents, which was built in 1863, was at first named the Sea King. She was of composite construction, ship rigged, and fitted with auxiliary engines, a telescopic funnel, and a lifting propeller, being designed for the China trade, in which she quickly won her spurs as a swift tea clipper. This excellent quality attracted the attention of the Confederate government, who bought her and fitted her out as a cruiser, naming her the Shenandoah, under which designation she became a terror to the Federal mercantile shipping. Moving about as an apparently harmless and innocent sailing ship, she would suddenly raise her telescope funnel, and, putting on steam, would rush upon her prey, and after destruction or capture, would again resume the guise of a sailing ship and proceed in search of further prizes. The civil war had been nine months at an end when her commander, Captain Waddell, first heard from an English vessel that peace had been concluded. Most of his crew then begged of him to run his ship ashore and let each man look out for himself; but this the captain refused to do. Instead thereof, he set sail for this country, and running the gauntlet of the United States navy for a distance of 20,000 miles, he arrived safely at Liverpool, where he surrendered to the Queen of England. The Shenandoah was afterward purchased by the Sultan of Zanzibar, who made her his yacht, and ultimately, we believe, her checkered career was closed by being wrecked on the African coast. It may be of interest to note that the dimensions of this remarkable vessel were 222 feet long, 32 feet 8 inches broad, and 20 feet 6 inches deep. Her gross tonnage was 1,018, and her engines were of 200 nominal horse power.

Curious Chinese Notions.

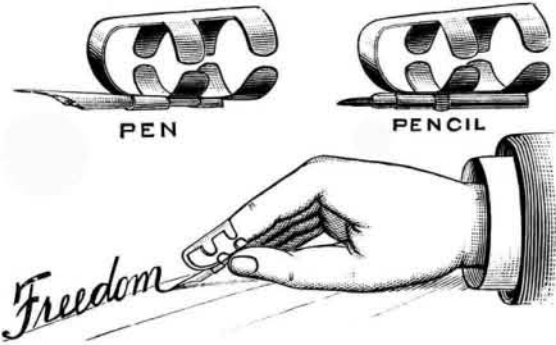
Both savage and semi-barbarous people have always exhibited a great repugnance to any surgical operation, however necessary, which involves amputation. The *North China Herald*, in commenting upon this circumstance, points out that the Chinese have always shown this repugnance, not on account of fear or pain, for they are patient under all kinds of physical suffering, but because they look upon it as a duty to keep the body intact. If they submit to the amputation of a limb, they invariably ask for the severed member, and keep it in a box, to be buried in due time with the owner. Sometimes they will actually eat it, thinking it only right that that which has been taken from the body should be returned to it. On the same principle, an extracted tooth will be carefully preserved, or ground to powder and swallowed in water. Another curious phase of the same idea is seen in the belief that a sick parent can be cured by broth made from flesh cut from a living child, and it is looked upon as a sign of filial piety for the child to submit himself to an operation for that purpose. The child is supposed to be of the vital essence of the parent, and if a portion of this essence is returned to the fountain-head, the parent will be greatly strengthened. The peace-loving nature of the Chinese is said to be largely due to this respect for the human body.—*Chambers's Journal*.

A Model Kitchen.

It is possible nowadays, says an authority, by spending money lavishly, so to build a kitchen that the most ingenious of servants cannot keep it otherwise than clean. One need not waste upon her unappreciative soul the costly tiles with which one lines the bath room, but may substitute for them the glazed bricks that are as highly polished, and that will make the floor, the chimney, the walls, if desired, and even the ceiling, as easy to clean as a breakfast plate. Once built, no white washer and no painter would be needed for such a room, no smoke need cling to its walls for an instant, and no odor of cooking would be perceptible in it, even if it were used for generations. And the temperature of such a room need not reach the great height unavoidable with plastered walls, which permit the warmth of the chimney to be perceptible through their surface, and thus both the good health and the good temper of the cook would be maintained. As for coloring, such a kitchen may be precisely what one pleases, for the bricks are made in all hues, and they may be laid in patterns or in wide surfaces of one tint from floor to ceiling. Lastly, as such a room would be fireproof, a sliding or swinging iron door would so isolate it that no kerosene-quickened fire and no careless upsetting of lard could bring destruction to the room itself of which a little water would not clear it.

FORSTER'S FINGER PEN AND PENCIL HOLDER.

This finger pen holder does away with the use of a pen handle, the finger itself performing this function. The holder slips over the end of the finger, and the springs hold it firmly in position for writing. The holder is stamped out of spring brass, German silver, silver, or gold. It will fit any finger without causing any inconvenience to the user, and when writing is interrupted it is not necessary to lay it down, but it may be worn until there is no longer any use for it. Any style of pen can be used, and it may be carried in a small box in the vest pocket. By supplying it with



FORSTER'S FINGER PEN AND PENCIL HOLDER.

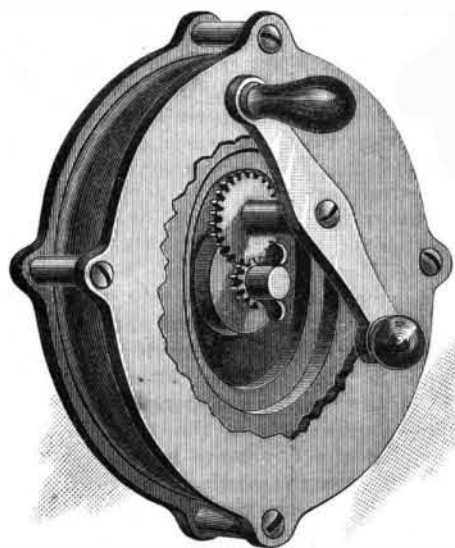
an ink tube, it may be used as a fountain pen. This is the invention of Edward E. Forster, 348 East 87th Street, New York.

Dampening Grain.

One of the largest millers in the United States, C. A. Pillsbury, is credited with asserting that American millers do not dampen their wheat before grinding it. This is correct of some millers, but not of all, and the reason is not attributable to differences in millers, but to differences in wheat. Most of the California wheat ground in this State is moistened, because it is found necessary to do so. On the other hand, Oregon wheat will not stand dampening, as it contains enough water without this treatment. On this account local millers prefer California wheat, as they can add the necessary water for nothing, which they have to pay for in the Oregon article. When shipped abroad or stored for months at tidewater, there is less difference, as wheat which is not moist will become so when in a damp atmosphere. California wheat when afloat gains two to three per cent from absorption of moisture. A certain percentage of water in wheat is essential to render it fit for grinding, and the moisture has to be either found in the grain or applied artificially thereto.—*San Francisco Grocer*.

AN IMPROVED FISHING REEL.

A simple and durable reel, by which the line can be easily wound up or unwound, or locked in place as desired, is shown herewith, and has been patented by Mr. Nikolaus Dilg, of No. 631 East Fourteenth Street, New York City. The outer ends of the flanges of the reel proper fit in recesses on the inside of the side plates, whereby the line is permitted to run freely without getting entangled. The reel has a central transverse shaft on which loosely fits a bushing, a pinion being formed on the outer end of the bushing to mesh into a loosely turning gear wheel, the hub of



DILG'S FISHING REEL.

which extends through the outer side plate, and carries on its outer end the reel handle. The shaft serving as the axis of the reel also projects through the outer plate, where it is screw-threaded and provided with a winged nut, adapted to screw against the face of the pinion on the bushing surrounding the shaft. By screwing this winged nut inward against the face of the pinion, the reel is pressed tightly against the inner side plate, and a rapid unwinding or winding up of the line is prevented. Our view represents the outer side plate partly broken away, all of the gearing being inside of the side plates out of sight, preventing the gear wheels from being clogged up.

How the Mare Island Navy Yard was Lighted with Gas.

Mr. J. R. Smedberg says: In 1878 I was employed to connect the mains of the Vallejo, Cal., Gas Company with the government gas holder in the Mare Island Navy Yard, the impediment being a tidal strait some 1,400 feet wide and thirty feet deep. The fee was a fair one, but conditioned upon the success of the work.

At the end of the Georgia Street wharf, on the Vallejo side, I placed an Otto engine, a piston gas pump, and a tension cylinder, with quick-motion gates to act like a fitter's pump in blowing out any water condensed from the gas in the droop of the traversing pipe. The inlet to the gas engine was, of course, provided with a little gas holder to insure regularity of explosion.

The next task was to get a two-inch galvanized wrought iron wire across the strait. A series of barges were moored, and the pipe jointed on them ready for lowering, but some tipsy sailors found an obstacle in the way of their evening expedition, and cut the mooring ropes, so that the whole flotilla swung with the tide and twisted the pipe almost into a knot.

We then decided, on the hint of Mr. Fagan, the Vallejo company's superintendent, to place a capstan on the Mare Island side and pull the pipe across by sheer strength. So this was done, with a beveled chair under the leading end of the pipe, and a buoy tied to it in case of accident, coupling on length after length from the Vallejo wharf. The completed pipe lay like a hollow rope on the bottom of the strait, was connected at both ends, the engine and pump were started, and the Navy Yard was, for the first time, lighted with coal gas, instead of gasoline.

Then it was the unexpected which happened, or rather the expected which did not happen. During three years the pipe was never trapped off; there was no condensation of water vapor in 1,400 feet of pipe laid in water, with a drop of thirty feet in the center; the tension cylinder was never used.

It occurs that the gas may have left the pump under so high a temperature, due to compression, as to retain its carrying power of the vapor through the long conduit because the linear velocity through that conduit was so high, in other words, that a larger pipe would infallibly have been trapped. The friction developed by high velocity against the interior surface of so small a tube must also have tended to keep up the temperature of the gas flow. The gas left the pump at 100° Fahrenheit, and went across at the rate of 2,250 cubic feet per hour. The linear velocity was therefore nearly twenty miles per hour, and the time of transit about fifty seconds.

Yellow Fever.

Dr. G. M. Sternberg, who was commissioned by the College of Physicians, of Philadelphia, to investigate the methods of protective inoculation as practiced in Brazil (by Dr. Domingos Freire) and in Mexico (by Dr. Cargona y Valle), reported that facts concerning the endemic and epidemic prevalence of the fever justify the belief that its cause is a micro-organism, which can, under suitable conditions, be propagated outside the body, as well as be capable of transport to a distance; also that, as a single attack of yellow fever, however mild, mostly protects from future attacks, there is reason to hope that such protection might be gained by inoculation. The yellow fever germ probably gains entrance into the body by the respiratory or alimentary tracts, or through the surface of the body, or it is possible that it multiplies in insanitary localities and develops a volatile poison which contaminates the air. The former hypothesis, that it enters the body and multiplies within it, is, he thinks, the more probable. Hitherto the germ has not been found in the blood and tissues of those attacked, for Dr. Sternberg does not confirm the alleged discovery made by Dr. Domingos Freire. Nor is there, in Dr. Sternberg's opinion, any satisfactory evidence that the method of inoculation practiced by Dr. Domingos Freire has any prophylactic value, and the same applies to the claims put forward by Dr. Carmona y Valle, of Mexico.—*Lancet*.

MR. W. CROOKES, F.R.S., has presented to the department of science and art a collection of sixty-eight radiometers and similar instruments for permanent exhibition in the science galleries of the South Kensington Museum. They illustrate the steps by which Mr. Crookes was led to the construction of the radiometer, and to the production of motion and of phosphorescence by streams of electrified molecules in high vacua. Many of the instruments are of the greatest historical interest. Among them is included the first radiometer, with many others which are described in Mr. Crookes' papers in the *Philosophical Transactions of the Royal Society*. Others are of considerable value, as they contain collections of diamonds, rubies, etc., for the exhibition of the phenomena of phosphorescence. Nearly all are in working order, and will be of great use in illustrating lectures to students in the Normal School of Science at South Kensington.