A FUEL THAT PRODUCES ELECTRICITY.

The object which M. Brard, of La Rochelle, has in view in his researches is to produce an apparatus capable of transforming heat into electricity without having recourse to the complications presented by dynamo-electric machines which have been hitherto inapplicable for domestic illumination. M. Brard wishes to produce a veritable electro-generative stove, furnishing at the same time heat, light, and electricity. After having demonstrated by his experiment that thermo-electric batteries have on one hand only a feeble production, and on the other hand are soon rendered useless under the action of heat, M. Brard thinks he has found, according to the *Electrical Review*, the solution of the difficulty in a thermo-chemical battery, in which the current is produced by chemical action, the combustion of carbon, under the influence of an elevated temperature produced by a special method, by the oxidizing action of nitrate of potash or soda. It forms thus a veritable thermo-chemical battery, analogous to the ordinary batteries, in which the oxidizing of the carbon takes the place of the oxidizing of the zinc, and the nitrate of potash of the oxidizing body. The carbon is, therefore, the negative pole, and the nitrate the positive pole of the element.

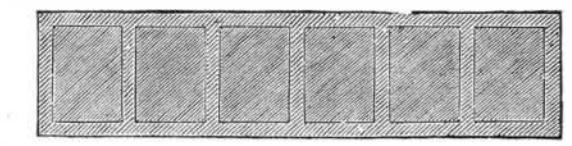
M. Brard alluded, in reference to his labors, to the experiments of Antoine-César Becquerel in 1855, and those more recently made by M Paul Jablochkoff in 1877; he has, however, gone further than his antecedents in this way, for he has presented to the association the principal features of an apparatus actually in construction, and showed some electro-generative slabs which we are about to describe, reserving the description of the complete generator until it has been tried, and until it has undergone certain modifications which the experiments will suggest.

Electro-generative Slab.—The electro-generative slab may be defined as *a piece of prepared carbon, which, when thrown into the fire, produces electricity by its combustion.* The subjoined figures, which represent the exterior view of it, the longitudinal section, and the transverse section, will demonstrate clearly the principle of it.

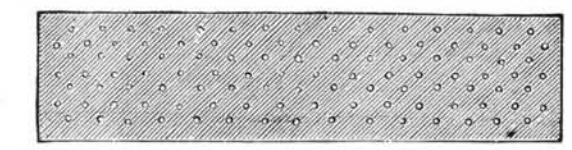
The slab presents the external appearance of a parallelopiped, about 15 centimeters (6 inches) long, 3½ centimeters, (2 1-6 inches) wide, and 25 millimeters (1 inch) thick; the materials which compose it are enveloped in a sheet of asbestos paper, only two thin sheets of brass being exposed to view, which serve as conductors of the current. The interior consists theoretically of a prism of carbon and a prism of nitrate of potash, separated by a plate of asbestos, which plays very nearly the same part as the porous cell in ordinary batteries. In practice the sheet of carbon is formed of about 100 grammes of coal-dust, formed into a paste with molasses or tar. The paste thus obtained is strongly compressed, cold or preferably with heat, in a mould of suitable form, at the bottom of which has been placed previously a sheet of copper, of brass, or any other metal which is a good conductor, cut into several strips, which are found embedded in the agglomeration of the carbon and project from one of its extremities to constitute the negative pole. The mould is disposed in such a manner that the slab is perforated throughout its thickness with numerous holes intended to facilitate combustion and to multiply the points of contact of the carbon with the nitrate, as we shall presently see. It bears besides upon the upper surface rectangular depressions, 15 millimeters deep, divided by transversal partitions more or less numerous, obtained by the moulding. The angles thus formed are intended to prevent the flowing of the melted nitrate into the fire during the working of the apparatus. The whole surface of these compartments is covered by a thin sheet of asbestos paper. The upper part of the brick is formed of a mixture of three parts of ashes and one part of nitrate of soda or potash. The ashes are intended to prevent a too rapid combustion, and to prevent the slab from melting. This mixture is melted and poured upon the brick very hot and in a sirupy state. About 100 grammes per slab are required, equal to about 25 grammes of nitrate and .75 grammes of ashes. A second sheet of copper or brass analogous to the first is embedded in the nitrate before cooling, and forms the second pole of the slab. The whole is enveloped in a sheet of asbestos paper.

It is sufficient to place in a fierce fire the extremity of the slab opposite to the conductors, in order to obtain in a few minutes a continuous current—and a constant one if the slab is homogeneous—during its combustion, lasting an hour and a half to two hours. M. Brard has not yet taken the constants of this new thermo-chemical battery, but in an experiment which we owe to the chemical department of the laboratory of the Lycée of La Rochelle, a single slab was sufficient to actuate an electric bell of the ordinary commercial form. One can, moreover, burn several briquettes at once, and group them in tension or in quantity to increase the effect. Three or four slabs in tension produce the decomposition of water.

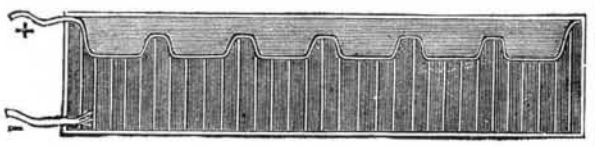
Such are the results at present obtained by M. Brard. Without expressing an opinion as to the future and the results which will be obtained from this apparatus, which is



TOP VIEW.

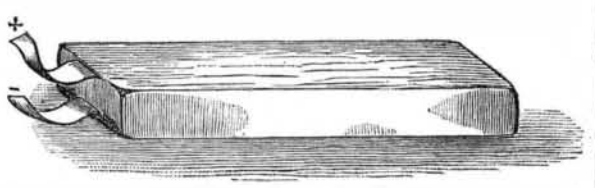


UNDERNEATH VIEW.



LONGITUDINAL SECTION.

TRANSVERSE SECTION.



GENERAL VIEW OF SLAB.

at present confined to the laboratory, we may observe that these researches are very interesting, and that to M. Brard must be ascribed the honor of having been the first to construct a veritable *electro-generative combustible.*

Decline in the Salmon Catch.

The salmon catch this year on the Pacific coast has been the smallest for many years. The canners blame the Chinese, but say nothing of the frightfully wasteful fishing wheels which they themselves have been using of late, destructive devices which unprejudiced observers have predicted would produce the result now complained of by killing all the young fish.

MEETING OF THE FRENCH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AT LA ROCHELLE.

The eleventh meeting of the French Association for the Advancement of Science recently took place at La Rochelle. As usual on such occasions, many interesting excursions were made to localities where historic curiosities abound. We shall not describe all these excursions, but shall speak only of the more interesting of them, and especially of the visit to Esnandes and its mussel crawls.

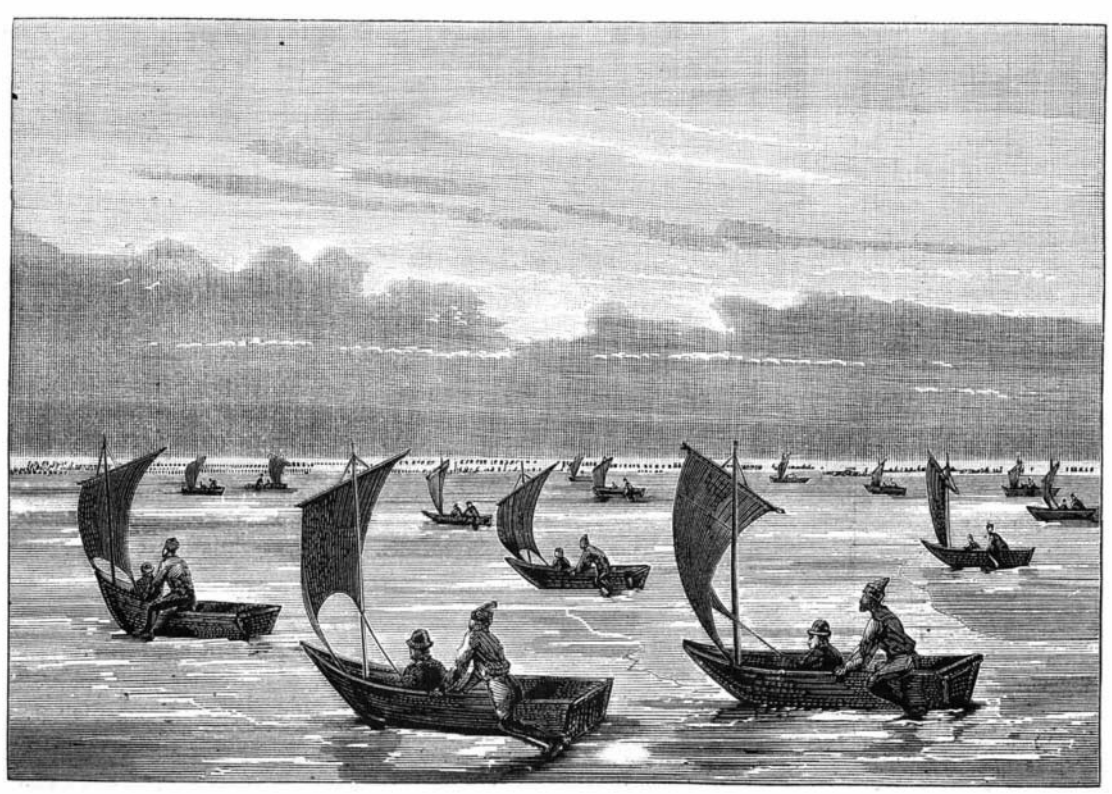
Sunday, August 27, everybody was astir, and omnibuses were filled with excursionists at the Place d'Armes, and set out one after the other for the coast at Esnandes, reaching it two hours afterward, during low tide. Here was seen an immense beach of slimy mud, on which it would have been impossible to venture without sinking in up to the waist. Yet it was necessary to cross this to reach the stakes that are planted at some distance out, and where the culture of mussels is carried on. For navigating this sea of mud the fishermen have devised a very ingenious process; this being the use of small flat-boats, called *accons*, that slide over the mud without sinking into it. In the middle of this boat they place the objects that they have to carry; in going, wooden poles or fagots for constructing the crawls, and in returning, the baskets filled with mussels. To move the accon forward over the mud they place themselves in the stern, with one leg hanging over the boat's side to serve as a propeller. By a series of energetic thrusts of the foot against the mud they cause the boat to glide along with great speed. When a visitor comes they place him in the middle of the accon, where he sits down on a little straw.

The fishermen are young and robust, and have acquired in this peculiar sort of work an uncommon skill. When the wind is favorable a small sail is hoisted in the bow of the accon, and this aids its running considerably. On the day of the visit to Esnandes it was curious to see the ocean of mud plowed by these little boats, each containing one—sometimes two—passengers squatting in the bottom, pushed along by long legs that successively bent and straightened after the manner of angle levers, and which served at once as boat hook and rudder. A few intrepid ladies likewise consented to participate in the excitement of this sort of navigation. It takes about half an hour to effect the crossing of the muddy beach. As soon as the ocean is reached the accon is shoved into the water and becomes a boat, which is maneuvered with either a pole or a wooden scoop serving as an oar. When the wind is favorable a sail is also used. The crawls are immense angles formed of stakes and handles, the base of which points toward the land and the apex seaward. A narrow aperture in the extremity of the angle, to receive nets or other apparatus to stop the fish at ebb tide, completes the crawl, and makes of it at once a mussel pen and a fishing place. It is here that the mussels are raised. It is asserted that this sort of culture extends back to the eleventh century.

"In 1035," says Mr. L. de Richemond, "an Irish bark ran aground at half a lieue from Esnandes. The master, named Walton, was the only one saved. Having settled in the country, he first invented the Allouret nets that serve for capturing the birds that sweep the surface of the water during the evening and night. To stretch these apparatus it was necessary to reach the center of the muddy beach. To effect this object Walton constructed the accon, a sort of boat from 2 to 3 meters in length and 50 centimeters in width, that was maneuvered by resting on one knee and propelling the boat with the other leg, which was incased in a long boot. In visiting his nets he perceived, one day, that the spawn of mussels had attached itself to the stakes, and that the shellfish thus developed in clear water were superior, as regards size and quality, to those that developed in the mud of the coast." It was then that he devised the crawls of which we have just spoken. Walton's invention was received with much favor. Following his example, others constructed crawls, and, without waiting for the mussel spawn to attach itself to the hurdles, it was collected on the coasts and carried to the inclosures prepared for it.

"At the same time," says Mr. De Quatrefages, in his "Souvenirs d'un Naturaliste," "the industry was perfected and systematized, so to speak, and each of its operations received a name, which, borrowed from another class of ideas entirely, might make one believe that two crawl owners when talking about their business were conversing about agriculture."

The small mussels hatched in spring are called "seed." They are scarcely larger than lentils up to near the end of May. Beginning with this epoch they grow rapidly, and, in July, attain the size of a kidney bean. At this time they take the name of "sets,"



MEMBERS OF THE FRENCH ASSOCIATION CARRIED TO THE MUSSEL CRAWLS IN ACCONS.

and are fit for transplanting. To perform this latter operation, they are detached from the crawls in deepest water, and are placed in pockets made of old nets that are fixed on wickerwork not so far in the sea. The young mussels spread all around the pocket, and attach themselves thereto by the aid of filaments called byssus by naturalists. In measure as they grow and space begins to fail them, they are "thinned out" and "transplanted" on to new poles nearer and nearer the shore. Finally, the mussels that have acquired their full size and become salable are "planted" on the highest crawls. Here it is that the "crop" is gathered. Every day an enormous quantity of freshly gathered mussels is carried to La Rochelle, from whence shippers send them to Tours, Limoges, and Bordeaux.

Arrived at the fishery, the owner of a crawl gathers his crop, and returns laden with it at the rise of the tide, which carries him to the shore without difficulty. The crawls, which are now arranged in seven rows, and some of which are one kilometer from base to apex, occupy a space 10 kilometers in length by 4 in width.

The next excursion of the association was made on the 29th of August to Saintes, for the purpose of visiting the remarkable buildings, etc., at that place; but steady rain prevented any localities of interest being visited on the occasion. After partaking of a dinner here, the excursionists left by rail for Rochefort. Arriving there the association visited the arsenal, and afterward the port, where a torpedo boat was made to explode, under water, an apparatus charged with guncotton, which shot into the air a column of water 20 meters in height. Afterward, there were visited the iron-clad Tonnant, now in course of construction, and the military hospital. In the evening, after dinner, a reception at the Hôtel de Ville wound up a very interesting day.

The final excursion, which was made on the 1st and 2d of September, to Royan and Ile de Ré, was, like the ones just mentioned, full of interest.—*La Nature.*

Petroleum in Missouri.

Very promising discoveries of petroleum are reported in Vernon County, Missouri, where shallow wells had been sunk by persons prospecting for asphaltum. The supposed asphaltum, which in places covered the ground to a depth of four or five inches, has been pronounced by oil experts to be heavy petroleum. It is described as of a blackish green color, and of the consistency of thick molasses. The region in which petroleum is supposed to exist in quantity is a plateau about 5,000 feet above the level of the sea, lying near the center of a spur of the Ozark Mountains and between two arms of Clear Creek. The soil is of a silicious nature, yet so finely decomposed that it is admirable for farming purposes. Beneath the soil there is a thin stratum of clay which rests on a layer of argillaceous rock. Underneath this rock is a stratum of porous sandstone from 20 to 40 feet thick. Next comes a thin vein of coal, and beneath that is the oil deposit. The wells that were sunk in the search for asphaltum are from 25 to 40 feet in depth. Arrangements are making for the sinking of deep wells.

Turkey-Red from Alizarine.

Fifty grammes turkish-red oil are dissolved in 1,400 c. c. water, 15 grammes of 22 per cent alizarine added, also 0·2 grain of tannin. The mixture is then slowly heated to boiling temperature, and 60 c. c. are added of a solution of aluminum sulphite of 1·1014 specific gravity, which has been previously mixed with 22 per cent of soda crystals. On prolonged boiling, the alizarine lake separates out, which is freed from excess of oil by washing with ether. It then forms a powder of splendid carmine red color, which is constant in the light, and is not attacked by dilute acids and alkalies. It still contains a certain quantity of oil, which cannot be removed by ether, but which causes the luster of the preparation. When mixed extremely well with water, the lake can be used for dyeing tissues in shades similar to those produced by eosine. By using other mordants than alumina, different shades can be obtained.—*A. Müller-Jacobs, Moskau.*

Zinc in Making Potash.

Numerous methods have been invented for converting the chloride of potassium into the more useful and hence more valuable carbonate. The latest is that of Wittgen and Cuno, in which zinc oxide, or its hydrate or carbonate, is added to a concentrated solution of potassium chloride, which is then subjected to the action of carbonic acid gas. A double carbonate of potassium and zinc is thrown down as a precipitate, while the zinc chloride remains in solution. The former is decomposed into its constituents by means of hot water, and the solution of carbonate of potash evaporated down. The zinc chloride solution still contains some potassium chloride and zinc dissolved as a bicarbonate. Upon evaporation of this solution, the carbonate of zinc separates first, and afterward the double chloride of potassium and zinc. The latter is separated into the two separate salts by dissolving and crystallizing. G. P.

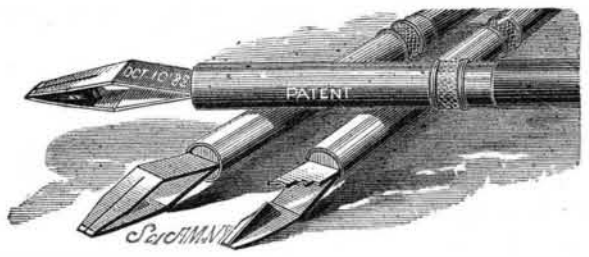
Salt in the Wyoming Valley.

An experimental well sunk for salt midway between the Warsaw and Wyoming wells (in Wyoming county, New York) has proved successful at the depth of 1,350 feet. This would indicate a wide extension of the Wyoming salt basin. The salt is exceedingly pure and in great quantity. The brine pumped is said to be nearly a third stronger than that of the Syracuse salt basin.

RECENT INVENTIONS.

New Shading Pen.

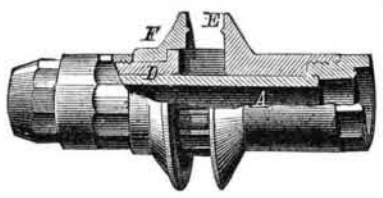
We give an engraving of a novel marking pen, called by the inventor "the chromatic," from the fact of its using two kinds of ink at once, the pen being provided with a longitudinal partition to prevent the mixing of the two inks. Each part of the pen is also made to put each kind of ink on the paper in delicately shaded lines, so that with



one stroke lettering may be made of two different colors that would be impossible with the old pen or a brush. The pen is especially adapted to lettering all kinds of show cards, notices, bulletins, signs, for making headings, etc. It is also excellent for writing mottoes, texts, etc. This invention was recently patented by Mr. J. W. Stoakes, of Milan, O.

Wagon Hub.

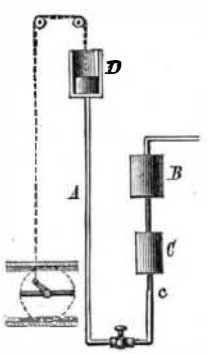
An improved hub for wagon or carriage wheels, shown in the annexed engraving, has been patented by Mr. John D. Torrence, of Vermilionville, La. A tapering axle box, A, provided at its inner end with enlargements for the collar on the axle, is screwed into a tubular core of the hub. It is provided at or near its middle with a ring of mortises, the separating partitions of which project above the surface of the core, so that the depth of the mortises will be greater than the thickness. The core is provided with a collar, E, forming the stationary end wall of the mortises, and having a height equal to about double their width. A



ring, F, is provided with a flange of the same outer circumference as the collar, E. This ring fits on the core, B, and the outer end of the core is threaded to receive a sleeve for holding the ring in place. A dust cap is screwed on the outer end of the core. The collar, E, and the flange of the ring, F, have annular sharp-edged projections on their inner surfaces. The tenons of the spokes are fitted into the mortises, one of the sides resting against the collar, E. The flange of the ring, F, is placed against the opposite surface, and is pressed firmly against the tenons by the screw sleeve on the core.

Draught Regulator.

We give an engraving of a device for automatically regulating dampers in steam boiler furnaces. It has been patented by Mr. Hippolyte Bisson, of Henderson, Minn. A pipe leading from the boiler is bent downward at right angles, and connected with a reservoir, B, in which steam is condensed to prevent direct contact of the steam with the mercury in a reservoir, C, below. From the reservoir, C, the pipe, *c*, is continued perpendicularly for a short distance and then turned horizontally, as shown; and in this portion is a cock for emptying the pipe and reservoirs of their contents. Beyond the cock, the pipe, A, is bent upward vertically, terminating in a reservoir, D, which is open at the top, and contains a float that is connected to the damper in the usual manner. When the pressure is up in the boiler it acts on the mercury, forcing it into the float chamber, raising the float, and permitting the damper to close by its own gravity. When the pressure is reduced the mercury flows back from the float reservoir, permitting the float to resume its normal position, opening the damper.

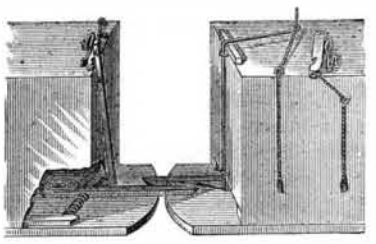


Insect Trap.

A trap for catching and destroying insects, shown in the annexed engraving, has been patented by Mr. William L. Waddy, of Peytona, Ky. Conical plates are provided with apertures in the middle, and are united by radial plates in such a manner that the cones project toward each other, and a short chimney provided with a cap is attached to the top of the device. The conical and radial plates are all made of reflecting material, so that a flame placed in the central aperture of the reflector will be reflected multifold, and a brilliant light will be produced. The insects are attracted to this light and rush to it, and strike the reflectors and drop upon the flame and are destroyed.

Car Coupling.

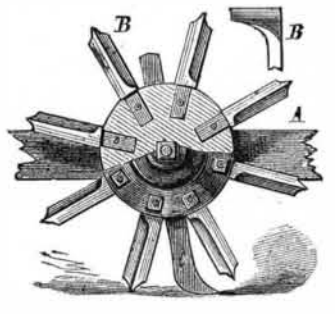
The accompanying engraving shows a car coupling which has been patented by Messrs. John W. Allen and Ashley B. Poynor, both of Franklin, Tenn. The draw bar of the car is connected to the frame in the usual manner, and is recessed to receive the shank of a coupling hook, which is pivoted to the draw bar by a bolt, and the forward or hook end of the coupling projects so far that it will readily engage the coupling hook on an adjacent car. The outer ends of the hooks are beveled upon their inner sides, so that they will slide past and engage with each other automatically as two cars are run together,



and they are also beveled upon their lower sides, so that they will slide readily upon the draw bars. The hooks are pressed forward to cause them to engage with each other by spiral springs attached to the draw bars and pressing against the hooks. The hooks are forced back to uncouple the cars by levers pivoted to the front end of the car, one arm of which rests against the forward side of the hooks, while the other projects over the top of the car. To this lever a cord is attached to operate it from the side of the car.

A Revolving Stalk Cutter for Plows.

The engraving represents a novel device for attaching to plow beams in front of the plow to cut the stalks and other rubbish that come before the plow when in use. A is a plow beam, having a colter, C, attached to it by two bolts, one above and the other below the beam. The bolts pass through the colter and a bar placed upon the opposite side of the beam from the colter, and have nuts screwed on their outer ends. The heads of the bolts are countersunk in the colter. A bolt which passes through the colter, midway between the yoke bolts, is countersunk in the inner side of the colter, and upon it is placed a hub that is secured in its place by a washer and nut, so that it will be free to revolve upon the bolt. In the inner end of the hub are formed radial sockets, into which are fitted the shanks of radial knives, B, secured in place by bolts countersunk into and passing through the knives and the hub, the outer surfaces of the knives being flush with the surface of the hub, so that the knives and hub can work close to the colter. The outer ends of the knives are tapered to an edge, so that they will take firm hold upon the ground, and thus rotate the hub, causing the successive knives to operate in connection with the colter as shears to cut stalks or rubbish. This device has been patented by Mr. Albert A. Kellogg, of Chamois, Mo.



Walking Stool for Children.

The engraving shows a new walking stool for the use of children when learning to walk. Such stools have been made with a ring-shaped top supported upon legs, and they have been used by placing the child's feet foremost through the top of the stool. This invention avoids this trouble by having a ring formed with a hinged section between two of the legs, so that the section may be swung outward. The section rests at the ends upon two of the legs, and is provided at its under side with a sliding bolt, for retaining the segment in its closed position. In the lower ends of the legs are balls provided with stems or shanks entering holes in the bottoms of the legs, so that the balls can be readily adjusted to vary the height of the stool to suit the child. The child can be readily placed within the ring by swinging out the removable section, and when the child is in place the section is closed and fastened. This avoids the necessity of placing the child in the ring feet foremost, and avoids the risk of injuring or breaking its limbs. The invention has been patented by Mr. Gustav Peterson, of Galveston, Texas.

A SHIP BURST BY WET RICE.—The Italian ship Francesca, laden with rice, sprang a leak and put into port at East London, May 11. She was promptly pumped out and a large force of men were set to work to unload her. The rice was in bags and the work was pushed with all speed; yet the wet rice swelled so rapidly that the ship was violently burst asunder May 13.