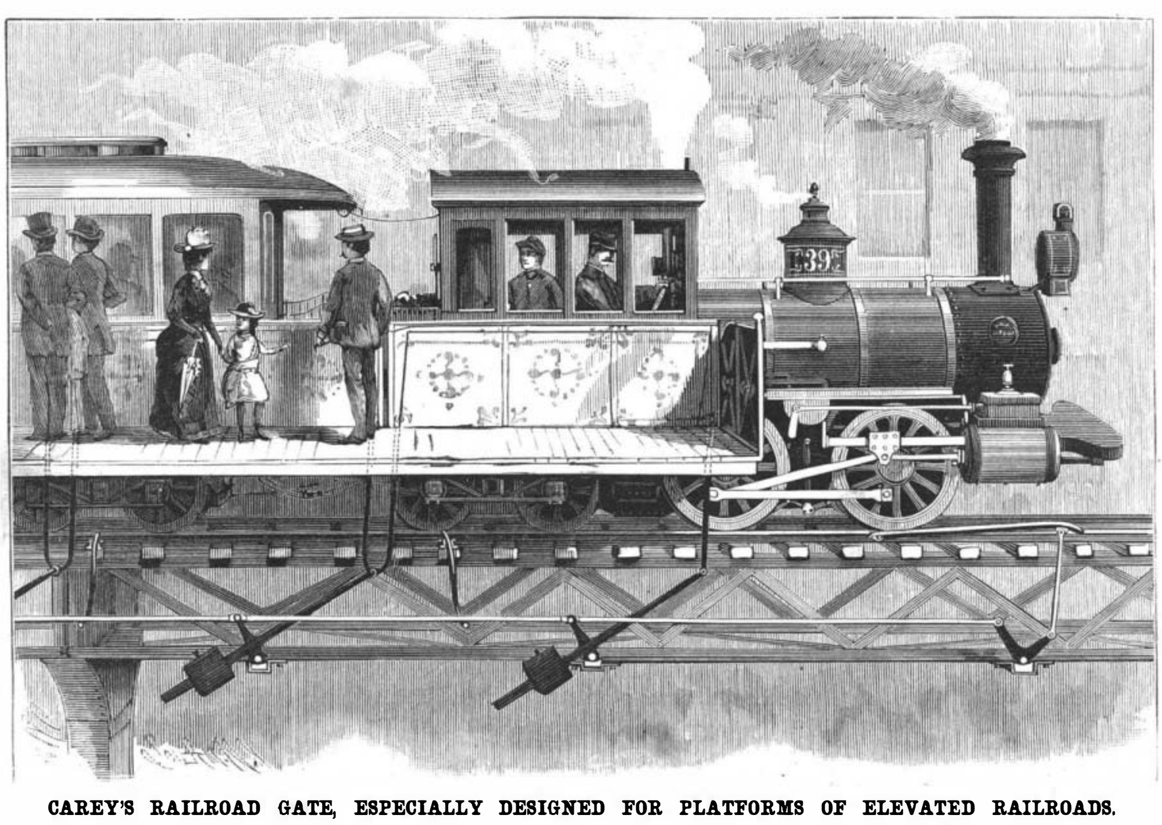
Tomatoes from Cuttings.

I am very much in favor of propagating tomatoes by cuttings. If a gardener has a good variety, and is not certain that it will come perfectly true from seed, the best plan is to keep up the stock by cuttings. The earliest fruits in spring are readily secured from plants rooted as cuttings in the autumn, and grown during the winter as store plants. At the present time, tomatoes that are about to cease bearing are producing numerous shoots, and if these are taken off and inserted at the rate of from four to six in a 4 inch or 5 inch pot, they will turn out well during the early spring months. The pots should be plunged in a little bottom heat until the cuttings are rooted, then harden them off a little, and keep them afterward with pelargoniums or plants of this sort. They winter better in a cool place, away from frost, than in much heat; but they may be potted singly and started into growth very early in spring, and it is then the cuttings have the advantage over seedlings. The latter are always inclined to make very long stems; but cuttings are always dwarf, and I have proved them over and over again to be earlier and produce more fruit than seedlings. All will admit that it is an advantage to have strong tomato plants early in spring, and autumn propagation by cuttings is a certain way of securing them.—*J. Muir, in Field.*

AN AUTOMATICALLY WORKING RAILROAD GATE.

A gate which is designed to be self-opening and self-closing with the movement of the cars on and off the track at stations, and which is more especially designed for use on elevated railroads, is shown in the accompanying illustration, and forms the subject of two patents recently issued to Mr. John B. Carey, a stenographer, of No. 109 Livingston Street, Brooklyn, N. Y. On the platform supports are secured a number of guides, which extend up to the outer edge of the platform, a vertically sliding gate being held between each two succeeding guides, the gates being connected at each end by a link with a weighted lever fulcrumed on a post or on a bracket secured either to the track posts or to the platform supports. From the fulcrum of each weighted lever extends an arm pivotally connected with a rod arranged horizontally along the platform, the outer end of the rod being pivotally connected with one arm of a bell crank lever pivoted on one of the track posts, and connected at its other arm by a link with the free end of a rail lever held alongside of one of the rails of the track. This rail lever is arranged in position covering the usual locomotive stopping places, and is so formed as to be acted upon only by the larger treads of the locomotive wheels, and not by those of the car wheels. Each gate link may be connected to a separate weighted lever, or the links of two adjoining gate ends may both be connected to one lever. The weights of the levers are so arranged that the levers hold the gates in a closed position and also hold the rail lever slightly extending above the rails of the track. When a train moves up to the station, the treads of the front locomotive wheels press the rail lever downward, swinging the bell crank lever, and drawing the horizontal rod forward, so that the weighted levers are swung to draw down the gates until the top edge of each is flush with the top of the platform, thus permitting passengers to pass from the platform into the cars, or *vice versa*, in the usual manner. As soon as the train starts to leave the station, and the treads of the locomotive wheels move off the rail lever, the gates move upward vertically again by the action of the weights of the levers, and the station platform is closed on its track side. Levers also extend from the horizontal bar to the track rails in such way that the passage of the train, before the locomotive reaches the rail lever, will cause the gates to move alternately up and down for a distance of about six inches, as a warning for those near them to keep out of possible danger. As a still further protection, a rod-like hand rail is held slightly out from and just below the top of the gate, being bent down at its ends and inclined inward. It is hinged on the gate at the platform edge, and is drawn down with it, but is extended in position by a spring as the gate rises, acting as a guard to keep people from crowding too closely up to the gate. Instead of operating the rail lever by the locomotive wheels, a special device located in the locomotive or in one of the cars may be employed, under the control of the engineer or a train hand, but the whole construction is designed to be simple and durable and to operate automatically.



CAREY'S RAILROAD GATE, ESPECIALLY DESIGNED FOR PLATFORMS OF ELEVATED RAILROADS.

THE DISTILLATION OF FRUITS AND MANUFACTURE OF BRANDY.

Among the fruits given us by nature some figure with advantage on our tables and others serve for the manufacture of brandy, preserves, marmalades, etc. Those of inferior quality and less pleasing aspect, and those that cannot be utilized in such a way, because of their abundance, are employed in the manufacture of fruit liquors. Through great carelessness, the larger part of such fruit is lost, thus depriving the land owner of a resource that is of no small consequence.

The distillation of fruits is an operation that is so much the more lucrative in that the law of December 14, 1875, relative to the privileges of distillers of wine and fruits, dispenses with affidavits and frees the farmer who distills the results of his harvest from inspection, and consequently exempts him from tax. The grower, then, has the best of reasons for utilizing the products of his land, since he can cheaply obtain an excellent liquor that he knows to be natural and healthful.

All fruits do not render the same proportional quantity of spirit, the proportion of the latter being greater or less according as they are more or less saccharine.

In Bohemia and Moravia, plums give a liquor called *sliwowitz*. The spirit obtained in France has a great analogy with kirsch, which is more especially produced by a small, black, very sweet cherry.

Kirsch is manufactured principally in Switzerland, in the Black Forest, and in France in Franche-Comte, the Vosges, and Meurthe-et-Moselle.

In Algeria, dates, sweet figs, and Indian figs yield an excellent liquor. Huckleberries and raspberries also are sometimes distilled, although rarely.

The method employed in the manufacture of spirits is just about the same, whether it concerns fruit with or without stones, and, moreover, it is very simple. As soon as the fruit has been collected in sufficient quantity, it is put upon an osier frame placed over a tub, and is crushed so as to make it give up all its juice, which, along with the pulp, passes into the tub. With plums, cherries, and other fruits whose stones are held back by the frame, care must be taken to throw these stones into the tub, as this is what gives the liquor that peculiar bouquet to which it owes its value.

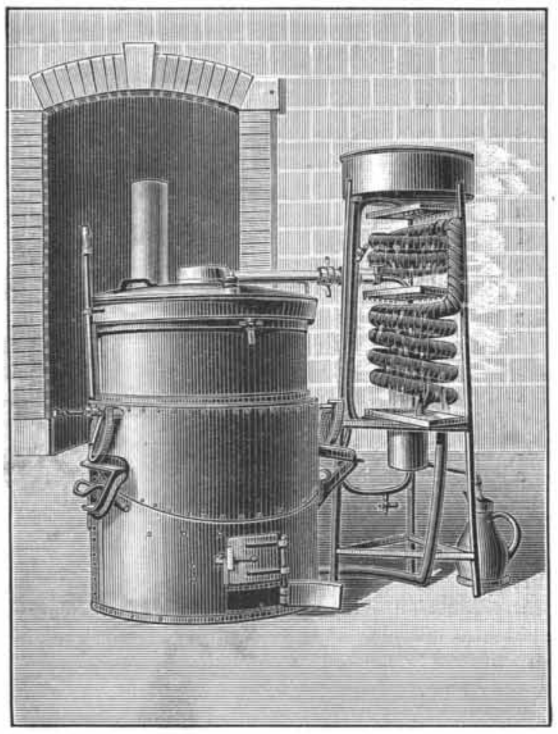


Fig. 1.—EGROT'S DISTILLING APPARATUS.

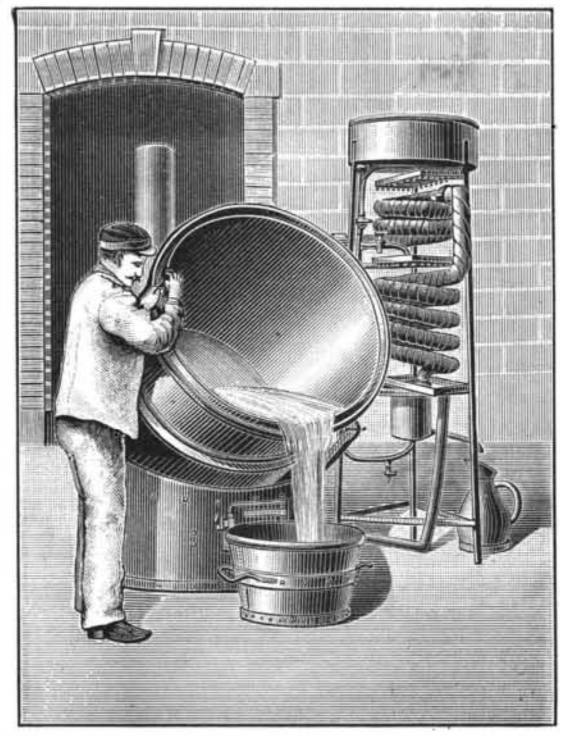


Fig. 2. MODE OF EMPTYING THE STILL.

The whole is then thrown into a fermenting tub, which is generally a cask with one head removed. Care is taken to pour in a small quantity of tepid water, in order to start fermentation, and then the cask is covered. A room must be selected that has a nearly equable temperature of between 18 and 25 degrees. The temperature of 25 degrees should never be exceeded, for, were it to be, fermentation would be arrested and the yield in alcohol would be diminished very largely. On the contrary, if the temperature were too low, the fermentation would proceed more slowly.

When the fruits to be fermented are dry ones, such as figs and raisins, they must be placed in tepid water and allowed to macerate. It is preferable to chop figs up, so that they may be reduced to a pulp. The water in which the fruit is macerated enters into fermentation in the same manner that the juice does.

The duration of the fermentation depends on the fruit. It may be eight days, and sometimes a month. Plums and cherries require from twelve to fifteen days. The cessation of fermentation is shown by the settling of the cap, which consists of grains and pellicles carried to the surface of the liquid by the disengagement of carbonic acid gas. It is likewise shown by the vinous odor that is emitted. When the fermentation is over, the liquid is drawn off and the marc is pressed in order to extract from it all the juice, and the latter is added to the liquid. In this state the juice is ready to be distilled. It contains not only the alcohol of the fruit, but also the latter's characteristic bouquet. Many routine distillers do not take the trouble to separate the solid and liquid material, but distill the whole in a pasty mass. But the spirit obtained has a peculiar, more or less pronounced empyreumatic taste, due to the boiling of the solid substances, which, despite all care, adhere to the side of the still and are burned.

The marc of the grape alone does not have to be fermented, since it is due to the fermentation of the fruit, contains alcohol all formed, and can be distilled at once, or be allowed to macerate in water, in order that it may give up its alcohol thereto. This latter method gives a better product, and one that has not the characteristic taste of marc spirits.

In the distillation of fine fruit alcohols, the liquid to be distilled is placed in a water bath, heated by a boiler over a fire, so as to prevent an empyreumatic taste from being given to the product. In this way the liquid to be distilled can never have a temperature of over 100°, and the product will have a delicate flavor that it would be difficult to obtain by direct heating over an open fire. The drawback to this method is that it takes a long time, and is relatively costly; and it should be employed only for obtaining superior products from very ripe and perfect fruit.

The still that has been employed up to the present furnishes, on the first distillation, what is called first runnings—an alcoholic product marking 20 degrees Gay Lussac. This distillate must be put back into the alembic to be distilled anew, and the product of this second operation is called faints. This is the ordinary brandy, marking 50 or 55 degrees; so that the production of this liquor necessitates two quite long operations. This complication explains the slight eagerness that farmers display to draw all the profit possible from their crop.

Mr. Egrot is constructing a distilling apparatus that does away with all complication, and gives alcohol at once, without faints. This apparatus excited much attention at the agricultural fairs this year, where it appeared for the first time. The condenser, which is constructed according to new principles, allows of a saving of more than half in the water used for cooling in ordinary stills, and, through an analysis of the vapors, effects a separation of the aqueous from the alcoholic ones. This condenser consists of two parts. In the first, which is in the open air, the product of the distillation condenses, and in the second, which is immersed in water, it is further cooled. The part exposed to the air is so arranged that the weak vapors condense in it, and return to the still. Nothing but the vapors rich in alcohol go to the condenser.

In order that the boiler may be quickly emptied and easily cleaned, there is a simple arrangement provided, by means of which it can be inverted by hand and without any effort.

The annexed engravings show Mr. Egrot's apparatus during distillation (Fig. 1) and at the moment the spent liquid is emptying from the boiler.

The copper boiler into which the liquid to be distilled is put rests upon an iron plate furnace, from whose front a semicircular piece has been removed. The boiler is provided with an iron plate that exactly covers this space, so that, when all is in place, the furnace looks like a common cylindrical one. To the boiler are affixed two parallel cams that rest upon brackets riveted to the furnace. These brackets serve as a guide to the cams in the operation of emptying the boiler, which, to this effect, is provided with a handle. The cover of the boiler, which is convex, is provided with a flange which, when the cover is in place, enters a channel at the top of the boiler. As this channel is filled with water, an absolutely hermetical joint is formed. The cover is connected with the condenser by a steam-tight coupling that is capable of being maneuvered almost instantaneously.

On a tripod of galvanized iron, surmounted by a reservoir of water, is placed a part of the condenser, consisting of straight copper pipes connected at the ends by elbows, and forming a worm. This part of the condenser is connected with a worm of very small size, immersed in water contained in a closed cylindrical vessel.

The condensing is effected through the water contained in the reservoir at the top of the tripod. From thence a pipe leads the water to the lower worm, where it gets heated in cooling the brandy. Another pipe leads it to a number of small distributing vessels, whence it falls in a shower on the large worm, and evaporates.

The operation of distilling is simple. The liquid to be distilled is poured into the boiler. If it is a question of distilling the marc of fruits, such as grapes, apples, and pears, care is taken to place a copper grating at the bottom of the boiler for the purpose of preventing the solid substance from touching the bottom and getting burned. A quarter of its bulk of water should be added to the marc The cover is put on, the joint is sealed with water, the worm is connected with the cover, and the fire is lighted in the furnace. The distillation then begins, and three-quarters of an hour afterward the liquid will be in full ebullition and vapor be entering the condenser.

When the separation of the first vapors is effected, those that are rich in alcohol condense, and are collected, on their exit from the worm, in the form of a very limpid spirit, fit for consumption. About three hours after setting the still running, the operation is finished, and the liquid treated is completely exhausted of alcohol. Then comes the operation of emptying the boiler.

The empty boiler is held in an inclined position by a simple device, and it can be very readily cleaned. When the cleaning has been effected, the boiler is placed in position on the furnace again, and is filled for another operation. It takes but one man to operate this still. On another hand, as the spirit obtained is without faints, it is better, and the cost of manufacture is reduced. The same is the case with the condensing water, the quantity of which used is scarcely half that necessary in the old style of apparatus.—*La Nature.*

The Preservation of Iron and Steel Ships.

The inner surface of the side and bottom plating in the earliest iron ships was protected by paint only against corrosion and such other wasting influences as might operate on the interior of the vessel. It seems to have been considered at that time the greatest wear and tear would take place on the outer surface of the vessel below the water line, and that it was sufficient on the inside to simply paint the surface of the iron, and lay close ceiling upon the frames as high as the upper turn of the bilges to form a platform for the cargo and keep it clear of the bilge drainage. But ship owners were not long in discovering that whatever might be the ultimate durability of the bottom plating, the wear and tear from corrosion proceeded at a much more rapid rate on the inside than upon the outside of the vessel. This was seen to be particularly the case in the flat of the bottom, where the inner surface of the plating and the rivet heads were exposed to the continual wash to and fro of bilge water with every roll of the vessel. This action was much intensified when hard substances, such as fragments of ballast and lumps of coal or other portions of cargo, found their way into the limbers; and as these accidental droppings through holes in the ceiling, or by reason of inattention when limber boards were lifted, proved to be of common occurrence, it became evident that some steps should be taken to provide greater protection to the inner surface than was afforded by two or three coats of paint. Among other means which were adopted, the employment of a thick layer of asphalt seemed for a time best calculated to meet the circumstances of the case. But after a time it was found that asphalt was not a stable protection, especially in the machinery spaces of a vessel. With a moderate rise of temperature the asphalt became sufficiently fluid to "run," and when a vessel had much rise of floor the protecting material would slowly leave the bilges and accumulate toward the middle line. Even the increase in temperature of such cargoes as grain or wool when stowed in the hold would at times be sufficient to soften the asphalt, and consequently expose a large area of the bottom plating, with its rivets and butt straps, to the wasting action of the bilge water and whatever hard substance might happen to be lying in the spaces between the frames. Ultimately, after trying various materials, the shipping community by common agreement pronounced Portland cement to be the most trustworthy substance with which to protect the horizontal portions of the inner surface of an iron ship's bottom. At the present day scarcely any other covering than this is employed, the only variation being in the proportion of sand which is added to the cement and in the extent to which such substances as brick, broken tile, and coke are incorporated with the cement at places requiring a more than ordinary thickness of the protective material.

The internal structural arrangements in the early iron ships were very simple, so that when the inner surface of the bottom and the frames below the bilges were well plastered with Portland cement, and the remainder of the ironwork was thoroughly painted, as much was done as appeared necessary to avert wasting through corrosion and attrition. Competition for cargoes was not so keen in those days, and freights were sufficiently high to render shipowners comparatively indifferent regarding the weight of cement carried in the bottoms of their ships. It was not at all unusual to pour in cement between the floors to a height of 5 inches or 6 inches at the middle line, and to place at least an inch of cement where it was thinnest at the bilges. An advantage was found in this, inasmuch as a flush surface was prepared level with the limber holes in the floors, upon which the water in the limbers could flow freely to the pumps. Moreover, with such a great thickness of cement to be worn through before reaching the skin plating, the presence of hard substances in the frame spaces became a matter of comparative indifference. It was when the cement was thickly applied to this extent that recourse was sometimes had to broken bricks, tiles, and coke, to economize both in regard to cost and weight. At the extremities of the vessel, in particular, spaces not sufficiently accessible to be kept properly clean and painted were, and still are, filled with a conglomerate of this kind.

On the interior of the vessel, where exposed to bilge water or to water ballast, paint is of very little use. Most ship owners have coated the surfaces at these parts with "cement wash," or, in other words, with a very fluid preparation of Portland cement laid on with a brush. The same kind of coating has often been laid upon the upper surface of inner bottom plating, and with fairly good results. Elsewhere within the vessel iron or steel work should be painted, the thoroughness of the painting and the number of coats applied being of greater importance than the nature of the paint itself, which may be red lead, iron oxide, or white zinc, just as suits the taste of the person paying for it.

Although "cement wash" has proved a fairly satisfactory protection to the iron or steel work at the parts already referred to, yet recent experience tends to show that more advantageous results follow the use of Stockholm tar and Portland cement. The surfaces coated must in all cases be free from oxidation and quite dry. If at all damp, the intended protection rapidly falls off. The surfaces are first coated with Stockholm tar, and at once sprinkled with dry cement powder until as much cement is applied as will stick to the tar. The tar and cement speedily amalgamate and slowly set; but when set, the protection is quite hard and wholly impermeable to water. The upper surfaces of inner bottoms may advantageously be covered with this protection, more especially when under engines and boilers. Indeed, the wear and tear to inner bottom plating below machinery and boilers has been found to be so great that in all probability the placing of double bottoms at that part of the vessel will, to a large extent, be avoided in the future. The wasting of double bottoms has become a serious question with the owners of some lines of steamers and with the committee of Lloyd's Register. Unless some means can be taken to check the corrosive action which is so destructive at that part of the vessel, it will be necessary to add considerably to the scantlings in order to provide a sufficient margin for possible and probable deterioration. The Stockholm tar and Portland cement remedy appears so far to meet the necessities of the case, and it is to be hoped that further experience will confirm present expectations regarding it.

Uncovered iron and steel decks continue to waste at a rapid rate, despite all the attempts hitherto made to check corrosive action. Coal tar and black varnish seem only to make matters worse, and the "let alone" policy appears so far to be as good as any. Singularly enough, the more traffic there is on an iron deck, the less the wear and tear is found to be. At the sides of large hatchways, for instance, the corrosion is less than at parts of the deck where men seldom walk. It is not difficult to explain this phenomenon. As is well known, oxidation of iron progresses most rapidly in the presence of existing rust. The rust of copper prevents further corrosion, and only by the constant exfoliation on the surface is the bottom of a copper sheathed ship kept clean. If that exfoliation is checked, the substance of the copper is preserved from wasting, but at the cost of a foul bottom. With iron the case is different. Oxidation engenders further oxidation, and hence the necessity for frequently scaling the surface of iron which is permitted to oxidize at all. The wear and tear of traffic near the hatchways wears away the scale of rust as it is formed, and consequently corrosion proceeds more slowly there than elsewhere on the iron deck. The constant falling of salt water on the deck is undoubtedly the cause of its rapid corrosion, and up to the present time no means appear to have been successful in keeping the water from acting on the surface of the iron. Probably, the Stockholm tar and Portland cement remedy would be as efficacious as any if it were hard enough to endure, but that is doubtful. Under present circumstances, the best course seems to be to scale the deck frequently, and so imitate at all parts of the surface the action which nominally operates so advantageously at the sides of the hatchways.—*The Engineer.*

An Aerolite Hoax.

The following clippings from recent exchanges explain themselves. The aerolite as a subject for hoaxes is becoming antiquated already.

From the New York Sun, Nov. 19, 1887.

FALL OF AN AEROLITE WEIGHING THREE TONS.

AMSTERDAM, N. Y., Nov. 18.—The *Recorder* this evening says: "An aerolite weighing three tons dropped with a loud report in front of the Merchants' National Bank, on East Main street, at 11:20 this morning, making a deep indentation in the ground. Great excitement was created by the occurrence, and large crowds viewed the celestial visitor. Local experts find traces of iron, nickel, aluminum, and other metals in the aerolite. The Dudley Observatory has been notified by telegraph of the meteor's fall."

From the Amsterdam Democrat, Nov. 19.

"A man came down from Fort Hunter this morning to see the 'aerolite.' A meteorologist from Troy arrived in town to-day, having come in haste, without his dinner, and was much disappointed when told that the aerolite was a hoax. It is also stated that a party are on their way hither from Philadelphia. A big stone did fall in the place indicated. The only trouble is that instead of falling from the sky, a wagon which was loaded broke down with it. That's all, but it rather spoils the sensation."

The conclusion reached by the Amsterdam journalist is ingenious, to say the least. The finding by the local experts of "traces" only of iron, nickel, and aluminum in the supposed celestial missile is suggestive of a discrepancy.

A New Electric Welding Apparatus.

The electric welder invented by Professor Elihu Thomson, which was described and illustrated in the SCIENTIFIC AMERICAN of November 26, 1887, has already found a rival in an apparatus devised by Messrs. Nicolas de Bernardos and Stanislas Olszewsky, of St. Petersburg. *Industries* gives the following :

The new method, which was invented almost simultaneously with that of Professor Thomson, has during the last few months been elaborated so as to render it applicable in cases where Thomson's welder cannot be used. The action of both instruments is based upon the conversion of electrical energy into heat in that place in the circuit where the resistance is greatest; but while in Thomson's welder this resistance is merely that of an imperfect contact between the materials to be welded, in the new apparatus it is that of an electric arc, and therefore considerably higher. As a natural consequence, Thomson's apparatus must work with very large currents of low e. m. f., and for convenience alternating currents are used, while that of Messrs. Bernardos and Olszewsky works with moderate continuous currents at a comparatively high e. m. f.

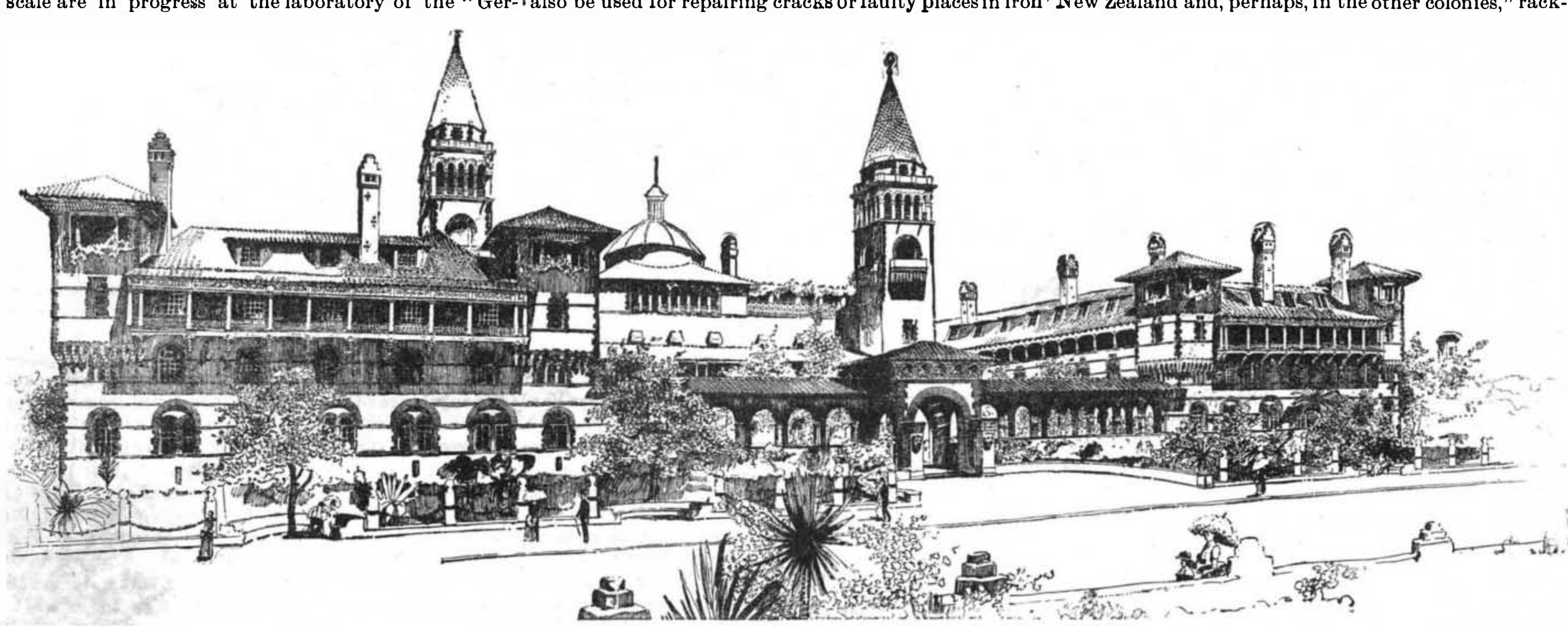
The first experiments were made about a year ago in the electric workshops at Creil, and were so successful as to induce Messrs. Rothschild, of Paris, to acquire the patent rights for several Continental countries. Further experiments were carried out last summer by Messrs. Garbe, Lahmeyer & Co., at an industrial exhibition at Aix-la-Chapelle, which the writer witnessed, and at the present moment experiments on a still larger scale are in progress at the laboratory of the "Germania," a marine engine works in Tegel, near Berlin. The process is as follows :

The joint of the two metals which are to be welded together is connected with the negative pole of a dynamo or other source of supply, the positive pole of which is formed by a carbon pencil. Under the heat of the arc the two metals are melted at their junction and fused together, the carbon being handled very much in the same way as a blowpipe. It is necessary that the current should pass from the carbon to the metals, as otherwise the latter would be volatilized. The metals do not oxidize, but through the presence of the carbon a slight reduction takes place. In this manner it is possible to join copper and iron, or steel and iron, or any two similar or dissimilar metals. The idea of thus welding by means of the electric arc is not new, but the inventors have elaborated the apparatus so as to make it commercially applicable. How small is the chemical change produced by the action of the arc at the joint is shown by the following table given by the inventors :

Composition of material.	STEEL. Before welding.	STEEL. After welding.	IRON. Before welding.	IRON. After welding.
Carbon........	0·48	0·25	0·34	0·14
Silicon........	0·04	—	—	—
Manganese.....	0·50	0·25	0·50	0·23
Sulphur........	0·04	0·04	0·14	0·09
Phosphorus....	0·08	0·07	0·12	0·11
Iron...........	98·86	99·39	98 90	99·43

It is necessary to carefully adjust the current to the work in hand, for if the current be too large a portion of the metals is volatilized, and if too small fusion does not take place, because the heat has time to flow away through the body of the metals. This adjustment is provided for by the use of secondary batteries and a suitable regulating switch to vary the number of cells in circuit. In the laboratory above mentioned, there is installed a dynamo giving 120 amperes and 175 volts, which is used for charging 280 accumulators grouped in four parallels. The plates of these cells are constructed in a similar manner to the Khotinsky accumulator, which made a brief appearance and then vanished again some few years ago. They consist of a lead frame, serving as a support for thin lead tapes alternately corrugated and straight, placed side by side within the frame. Since the dynamo is always kept running, storage capacity is not of so great importance in this process as the ability of the cells to discharge very large currents for a short time. The inventors employed at first e. p. s. cells, but finding that their greatest merit, which consists in large storage capacity, was not of much use in this particular application, they reverted to the type above described, which more nearly approaches the original Plante cell. Owing to the reducing action of the carbon, it is possible to weld metals even if they be coated with a slight layer of oxide, and in no case is any cleaning of the joints necessary. To give an approximate idea of the energy required in this process, it might be mentioned that during the experiments above cited a lap joint between iron sheets of 2 mm. thick was welded with a current of 15 amperes supplied at 65 volts pressure. Thin lead sheets can be welded by the use of from two to five cells, the carbon pencil in this case being 5 mm. diameter. It is also possible to perforate metal plates by the arc, the carbon pencil being simply pushed through the plate as fast as the metal melts, and the writer has seen a lap joint of two ⅜ in. boiler plates, in all ¾ in. of metal, thus perforated. It is remarkable that the perforation can also be carried on under water.

One application of this invention is the welding of the heads in wrought iron petroleum casks, and it may also be used for repairing cracks or faulty places in iron or metal castings. Although the apparatus is very much more costly and considerably more cumbersome than that of Professor Elihu Thomson, it has the great advantage of being applicable to almost any kind of welding which may be required in metal work.



HOTEL PONCE DE LEON.—[See first page.] *

* Views of the Hotel, the Alcazar, and other St. Augustine improvements will be published in the January number of the SCIENTIFIC AMERICAN ARCHITECTS AND BUILDERS EDITION.

American Export Trade.

Our manufacturers have been so accustomed to finding a good market at home for their products that less attention than is desirable has been paid to the extension of their foreign trade ; nevertheless, the great superiority of many articles of American make has created for them a wide and rapidly increasing foreign demand. Mexico, South and Central America, South Africa, and the Australian colonies are among our best customers. Canada we already look upon as a home market.

South Americans will probably continue to be more permanent, though at present less important, customers for us than are the Australians, who are too "Yankee" to remain long indebted to any foreign country for what they can themselves produce. They buy our stamp mills and some other articles only to imitate them in their own machine shops ; but there is always something which cannot be imitated and which characterizes American machinery, namely, the embodiment of the lessons of experience. In mining machinery and appliances, there can be no set type best adapted to all conditions, and those who simply copy an American stamp mill may be very far from securing American practice. There are modifications from the main type which are suggested by experience in the treatment of each different kind of ore, and it is this varied experience, and the characteristic genius in adopting suitable means in the solution of new problems, which give rise to those variations in details which alone enable the person to attain the best and latest American results.

From the British consular reports, as published in the *Engineer*, we find that American exports to Chili have increased in the ten years, 1875 to 1885, 43·8 per cent, being exceeded in percentage only by the growth of German exports. Among the articles in which we show a large increase are agricultural implements, 356 per cent increase ; carpenters' tools, 85 per cent ; hardware, 391½ per cent ; iron nails, 56½ per cent ; machinery, 196 per cent ; plows, 35½ per cent ; thrashing machines, 13½ per cent ; wire nails, 800 per cent. These figures show a very gratifying growth in a but slightly cultivated field.

In Australia and South Africa we have made great progress, the more enterprising people being wisely desirous of obtaining "the best" of everything. The pages of the *Engineering and Mining Journal* are constantly telling of the sending of quartz mills, Krom's steel crushing rolls, concentrating machinery, smelting plant tools of all kinds, and American experts to manage these things, to all the Australian colonies—the two great Australian bonanzas, the Mount Morgan gold mine and the Broken Hill silver lead mines, being among our largest customers. South Africa, the rich gold mines of the Transvaal in particular, are getting mining machinery in this country, and from all sides comes testimony to the fact that American machinery, tools, and appliances, when purchased through responsible houses, are more reliable and give far better economic results than those made in any other country.

In the *Australasian Ironmonger* we note long lists of American goods which are highly commended ; among these are saws, spades, shovels, picks, weighing machines, Rand rock drills, "the most popular drill in New Zealand and, perhaps, in the other colonies," rackarock, axes, Worthington's steam pumps, mill machinery, American stoves, "always growing in popularity," tram cars, barb wire, lager beer, and innumerable other articles.

There are numerous references in our Australian exchanges to the great mining records, almost equaling our own, made with the Rand slugger drills and rackarock. In fact, we have before us a list of no less than thirty-one different parties in New South Wales, Victoria, Tasmania, and Queensland that are using these deservedly popular American drills and explosives.—*Eng. and Min. Jour.*

Emission of Light by Solid Incandescent Bodies.

It is generally admitted, according to the researches of Draper, that when a solid body is heated it begins, at about 525° C., to emit red rays, to which are successively added radiations more and more refrangible as the temperature increases. The investigations of M. Weber have led to different results.

By observing, in an absolutely dark room, either an incandescent lamp, excited by a current of gradually increasing intensity, or plates of different metals heated by a properly adjusted Bunsen burner, he found that the emission of light begins at a temperature much below that which we have mentioned, with the production of very pale gray rays, whose refrangibility is equal to that of the yellow and greenish yellow rays of the central spectrum. As the temperature rises the light emitted grows yellow and gives in the spectroscope a wide gray band, whose center is tinged with grayish yellow. At low red, a narrow red line appears at one side of this band, and almost at the same time a green band, large and of slight intensity, appears at the other side. The temperature still rising, the spectrum spreads both toward the red and green ends, and M. Weber further ascertained, by means of a thermometric element soldered to the plates, that the first traces of gray light are emitted at a temperature varying with the nature of the plate, about 396° C. for platinum and 377° for iron.—*Revue Scientifique.*