THE FRENCH CRUISERS "CECILLE" AND "SUCHET" AT NEW YORK.

New York city has just been favored with a visit from two of the best cruisers of the French North Atlantic Squadron. The vessels anchored in the Hudson River, near Thirty-fourth Street, and attracted not a little attention from the citizens of New York, to whom the long, projecting, ram bow and the tumble-home sides of the two vessels were a forcible reminder of the notable gathering of foreign warships in our harbor in 1893 in connection with the Columbian Naval Parade. By the courtesy of Rear-Admiral Richard we are enabled to present the accompanying photographs of the vessels, the two views, which show a deck view from the bridge and one of the broadside guns, being taken aboard the Admiral's own flagship "Cecille."

These two cruisers being of the same class, but built at different periods (there being an interval of five years between them), represent to a certain extent the progress of ideas and construction in the French navy during the period 1888 to 1893. The tendency to increase the speed is seen in the fact that while the "Cecille," the earlier boat, has a speed of 19 knots, the "Suchet" is credited with 20·4 knots. It was during this period, moreover, that the rapid-fire system was introduced, and its effect is seen in the lessening of the total number of guns carried, the "Cecille" having eighteen rifles, while the "Suchet" has less than half that number. The guns of the "Cecille" originally were all of the slow-firing type, although the eight 6·4 inch guns on the main deck have now been converted to the rapid-fire system. The particulars of the two ships are as follows:

"CECILLE."—The "Cecille" is of iron and steel construction and measures 378 feet 9 inches in length over all, 49 feet 3 inches in beam and 19 feet 9 inches in draught. She is propelled by twin-screw engines of 10,200 horse power at a speed of 19 knots an hour. Her displacement is 6,053 tons, and when she is at her mean draught she carries a normal coal supply of 940 tons. Her full complement of officers and crew is 486. She is of the protected as distinguished from the armored type, reliance for keeping out projectiles being placed upon a curved deck of 4-inch armor. The armament of the "Cecille" is very numerous, and even for the day in which she was launched was extremely powerful. The guns are distributed on two decks; on the main deck there are eight 6·4-inch rapid-fire guns, six of them carried in sponsons on the broadside, while one is placed forward in the bows firing through a gun port immediately above the ram, and the other is placed aft on the quarter-deck to act as a stern chaser. On the gun deck below is arranged a powerful battery of ten 5·5-inch guns mounted in broadside. There are also six 6-pounders and fourteen machine guns, distributed on the bridges and in the fighting tops. The vessel is provided with four torpedo tubes. When the "Cecille" was launched, she carried a full set of yards on her masts and was one of the last of the French cruisers to be thus equipped; but during her reconstruction the topmasts and topgallant masts were removed and short pole masts for signaling purposes took their place. While the alteration has served to conform the "Cecille" to modern ideas, it has stripped her of much of her handsome appearance.

"SUCHET."—Although the "Suchet" is classed like her sister ship as a second-class cruiser, she is not much more than half as large. With a length of 318 feet, a beam of 43 feet 6 inches and a draught of 17 feet 6 inches, she has a displacement of 3,500 tons; she has twin-screw engines of 9,000 horse power which gave her on her trial a speed of 20·4 knots. Her normal coal supply is 480 tons, and she has a complement of 246 officers and men. The protected deck has a maximum thickness of 3 inches. Although this armor is 25 per cent less than that of the "Cecille," it is probably of equal resisting power, owing to the fact of the armor being of a five years' later date. The armament consists of four 6·4-inch guns on the deck above, one being used as a bow chaser, another as a stern chaser, and the other two being mounted in sponsons on the broadside. The "Suchet" was built at Toulon, and her design and construction may be taken as representing the best work of a modern French naval dockyard.

Anniversary of the Submarine Cable.

The 28th of August was the 50th anniversary of the first submarine cable. In 1850, upon this date, the first message was transmitted between France and England by the short section of cable laid between Dover and Cape Grisnez. The promoter of the first submarine cable was Jacob Brett, who had obtained the concession, in 1846, from King Louis Philippe. This was confirmed in 1850 and the project was carried out in three months, the constructor being the engineer Charlton Wollaston. The first cable was, however, of short duration, as the next year a Boulogne fisherman brought up a part of the cable with his nets and cut it, thinking that it was a sea-serpent. The French government then gave a new concession, and as the new submarine telegraphy had now convinced the skeptics, a company was formed in 1851 which laid a new cable; this was subsequently purchased by the English government. The first cable had a length of 25 nautical miles. The wire was the thickness of the little finger and weighed 440 pounds per mile; a series of lead weights attached every sixteenth of a mile held it in suspension at a maximum depth of 60 yards below the surface. The Birmingbam factory which supplied the cable could only deliver the wire in sections of 200 yards, this being in marked contrast with the 200-mile lengths which are produced to-day. The transatlantic cable was laid at a later date.

A Seaboard Line for the Iron and Steel Carrying Trade.

BY WM. GILBERT IRWIN.

Just now the project of Pittsburg iron and steel manufacturers to build a trunk line to the Atlantic seaboard, in order to establish independent rail connections with Pittsburg, Chicago and St. Louis, is receiving serious attention in railroad circles. In the construction and highly successful operation of the new Bessemer road, the Carnegie Steel Company has given an exhibition of the possibilities along this line for the big manufacturers. Since that time there never have been any difficulties in the matter of ore transportation, and while the Carnegie Company has many advantages through the operation of their own line, other manufacturers have been able to obtain very satisfactory rates since that road has been in operation.

Just at this time the foreign markets are the object of all the big iron and steel manufacturers, and there is an unprecedented demand for our products abroad. It is in this export trade that the freight rates are felt, and in order to successfully compete with foreign manufacturers, who have so much the advantage in the way of distance, economy in the cost of shipment has become necessary. The present freight rates on iron and steel articles, such as plates, bars, channels and beams, pipe and other commodities, is $4.03 per gross ton from Pittsburg to New York. Billets are sent to the same place for $2.90 per gross ton. The manufacturers have demanded a uniform rate of $2 per gross ton, and with such concessions they have figured that they will be successful in conquering the export trade of the world. As it now is, the manufacturers of the Pittsburg district claim that they are offered large orders for export steel that they are unable to figure on because of the excessive rates to the seaboard. They claim that freight rates are higher at present than they were twenty years ago, when steel was selling for four times the price now current. They protest that in the meanwhile the cost of railroad operation has been enormously reduced, and that while the average freight rates have been reduced the charges from Pittsburg are higher than they were many years ago. In fact, they claim an unjust discrimination against Pittsburg.

The Pittsburg manufacturers assert that steel is no harder to handle than other commodities, that the cars are loaded to their full capacity. They claim that it costs more to build a box car to haul grain than it does to construct a gondola to carry steel, and that when a grain car is wrecked it means a loss of $1,500, while in the case of a car of steel the product can be placed in another car and hurried to its destination. It is also pointed out by the Pittsburg manufacturers that the rate from Buffalo to New York by the Erie Canal is only five cents per hundred, while that from Cleveland is only three cents more. Some Pittsburg exporters, by taking advantage of the roundabout way and paying the local rate of eleven and a half cents from Pittsburg to Buffalo, have been able to save one and one-half cents per hundred over what they would be required to pay on a direct all-rail haul to the sea coast. The regular summer rate was withheld this summer, in which fact the manufacturers have another cause for complaint. Summer rates have been customarily granted by the railroads in order to secure the trade of lake cities in competition with low-priced water hauls, and also to protect the shipper in the districts in which no water transportation is available.

Another reason given by the manufacturers why rates to the seaboard should be low is the high ocean rates now in force. The heavy inroads made on the merchant marine, first by the English government to secure transports for the Boer war and now the heavy demands made by the Powers for use or reserve in China, have taken many vessels out of the service from New York, Philadephia, Baltimore and Boston to European ports. It is also pointed out that five years ago, when steel was selling for twice the figure now received, the rates were only $2.40 per gross ton. It is the claim of the manufacturers, and seemingly a just one, that Pittsburg above all other cities needs the fostering influence and protection of the railroads. Fuel is yearly, owing to the progress of engineering science, becoming less important, and its costs are being yearly reduced by invention and improved methods.

In view of these conditions there have been several conferences between the manufacturers and the traffic managers, and as a result the manufacturers have come to the belief that no aid will be extended to them. At a joint meeting held last month, the representatives of Pittsburg manufacturing concerns which pay an aggregate of $100,000,000 were present. The result was far from satisfactory, and now Pittsburg manufacturers can see relief only in a great trunk line from Pittsburg to the seaboard with western connections. They have estimated that $30,000,000 will easily build all the trackage needed, and this sum only represents five per cent of the $600,000,000 invested in Pittsburg industrial concerns.

The manufacturers seem to agree that the Philadelphia & Reading, which has terminal facilities in Philadelphia superior to the Pennsylvania or B. & O., is the line to make the nucleus for the seaboard line. The plans are to use the Bessemer & Lake Erie road of the Carnegie Company to a point near Unity, where the old Calvin Brice system crossed the Bessemer line. From this point the new line would follow a natural divide up the Kiskiminetas and across the country to Mehaffey. The west branch of the Susquehanna would then be followed to Williamsport, where the Philadelphia & Reading road would be reached. The line to be thus built would have a length of one hundred and sixty miles and would cost about $50,000 per mile, or between $8,000,000 and $10,000,000 for the great link. The plans of the manufacturers would be to obtain possession of the new road now being built up the west branch of the Susquehanna. The average grade of this line would be below one per cent. The Union road of the Carnegie Company, the Monongahela connecting road of Jones & Laughlin, the McKeesport connecting road and other lines about Pittsburg would make a complete terminal chain of the Monongahela Valley, and a system of boat lighterage on the rivers would give a most comprehensive and perfect terminal in Pittsburg.

Just now the Lake Erie and Ohio River Ship Canal, which is to connect Pittsburg with Lake Erie, is receiving much attention. The American Steel and Wire Company is constructing a line of boats which will be used on the Great Lakes during the summer as ore carriers, and in the fall they will be sent across the Atlantic with steel for Europe and will be used regularly in the export trade on the Atlantic during the winter. With the construction of the canal, it will be possible for two or three thousand ton boats to make the trip to Europe by the Great Lakes, and thus the question of freight on foreign shipments from the mills of Pittsburg would be solved. But just now the matter of securing independent rail connections with the seaboard is the question uppermost in the minds of Pittsburg manufacturers, and the near future is certain to see some interesting developments in railroad affairs so far as Pittsburg is concerned.

Automobile News.

The Cooke Locomotive Works, of Paterson, N. J., have just finished a heavy motor wagon on the Thornycroft plan.

An interesting automobile suit was tried at Hackensack, N. J., where J. L. Guyre sued Dr. W. L. Vroom, of Ridgewood, for damages from a runaway, said to have been caused by the latter's automobile, and resulting in the death of the plaintiff's wife, says The Western Electrician. Dr. Vroom's testimony was that the horse was frightened and turned when 275 feet away from the automobile, which he stopped upon seeing that the animal was afraid. He said that he had the machine under perfect control, and gave an exhibition in front of the court-house to show the court and jury his ability to handle it. During the trial Justice Dixon said: "If the automobile occasionally or exceptionally frightens horses, that would not make it a nuisance. In order to make it a nuisance, its common effect must substantially interfere with the people who drive horses along the highway." After being out a few minutes the jury returned for further instructions on one point, at the same time informing the court that it had agreed that the automobile was not a nuisance.

A large English constructor, J. Fowler, of Leeds, has recently furnished to the British government an armored automobile train, consisting of a number of cars towed by a road locomotive. This is the first of a series which is to be constructed upon the same principle; it will no doubt be of great service in the army. The first train has been tried in England not long since, and has proved satisfactory; it can mount a 10 per cent grade when heavily loaded. The engine carries a windlass mounted upon it, and, if necessary, can mount the grade alone and then pull the train up the grade by means of a rope. The locomotive is of the usual road-engine type; it draws three or four cars. Both locomotive and cars are protected by special plates to resist balls or bursting shells. Each of the cars is arranged to carry a howitzer or a machine gun of about 3 inches, or to transport men, ammunition, or provisions. The armor plating is built separately and may be taken off in sections to allow inspection or repairs. The speed is from 2 to 6 miles per hour. The locomotive has a set of transmission gearing by which three different speeds may be obtained. The water reservoir has sufficient capacity for a distance of 10 to 15 miles. The engineer is well protected and has at hand all the levers and valves for operating.

Science Notes.

A new diamond field has been found forty-two miles from Griquatown in Cape Colony.

There has been a third trial of Zeppelin's airship, which took place on October 21. It ascended at five o'clock in the afternoon, and after rising 900 feet it described a circle and then moved to the eastward and performed various evolutions to show that it was under full control. It then turned and went three miles to the south and afterward returned and descended. There was not the slightest hitch during the trial.

It has been considered until recently that it was almost impossible to produce cheese from pasteurized milk, but a short time ago a chemist of Stockholm succeeded in effecting a preparation that solved the difficulties. Owing to this discovery, the product of which has been named "caseol," palatable and nourishing cheese, free of tubercular bacili, can now be made from pasteurized skimmed milk. This preparation has, moreover, the excellent quality of rendering cheese more digestible. Several dairies in London have made experiments with "caseol" with the same favorable result.

Mr. Evelyn B. Baldwin is making preparations for a Polar expedition, the objective point being, of course, the North Pole. He is being backed in his enterprise by Mr. William Ziegler, of New York. The expedition will start next summer, and it is expected that two ships will be equipped in order that one might remain behind while the other returns south for fresh supplies. By this plan the ship remaining in the Arctic could be used for headquarters of land expeditions. It is probable that the vessels will be specially constructed like the "Fram." Mr. Baldwin was with the Peary expedition of 1893–94, and spent the winter of 1898–99 in Franz Josef Land, as a member of the Wellman expedition.

The selection of names for the Hall of Fame on University Heights, New York city, includes a number of inventors and scientists. Among them are Benjamin Franklin, Robert Fulton, S. F. B. Morse, Eli Whitney, Peter Cooper, Elias Howe (?) Asa Gray, etc. There were ninety-seven judges, and the names given are from the first thirty. The order of precedence and the full list was as follows: George Washington, Abraham Lincoln, Daniel Webster, Benjamin Franklin, Ulysses S. Grant, John Marshall, Thomas Jefferson, Ralph Waldo Emerson, Henry W. Longfellow, Robert Fulton, Washington Irving, Jonathan Edwards, Samuel F. B. Morse, David G. Farragut, Henry Clay, George Peabody, Nathaniel Hawthorne, Robert E. Lee, Peter Cooper, Horace Mann, Eli Whitney, Henry Ward Beecher, James Kent, Joseph Story, John Adams, William Ellery Channing, John J. Audubon, Elias Howe (?) Gilbert Stuart, Asa Gray.

The problem of supplying ink wells for schools, insurance offices, banks, etc., is much more complicated than might be at first supposed. If each employe fill his own ink well, bottles of ink are broken, disfiguring property. A writer in Science and Industry describes an ingenious plan for distributing ink. It consists of a wooden carrier with four partitions, a handle and two little projecting shelves for supporting the inkstands. Three bottles of ink are put in the carrier, and a large tumbler is put in the fourth space to take the dregs. Each bottle has a combination stopper and pump, which consists of a rubber bulb attached to the stopper. When the bulb is pressed, the air forces the ink up through the tube and ejects it into the ink-well. The ink never drops from the nozzle after filling the inkstands, for the moment the hand is removed, the ink in the nozzle and tube drains back to the bottle, air being sucked in through the nozzle to take its place. Red, black, and copying ink is regularly kept in the carrier.

The new National Museum at Munich is one of the most interesting in Europe. The problem of arrangement was a most complicated one, and the difficulties have been solved in an admirable manner. The building cost about a million dollars, and contains a hundred rooms. The objects are shown, as they should be, in comparatively small galleries. The leading principle is that the ground floor should show, in strict chronological order, Bavarian life of different epochs, from the little circular room which in its architecture and its contents recalls the tenth and earlier centuries down to the blue and gold magnificence of the late King Louis. In the earlier rooms the sense of architectural evolution is greatly helped by the fact that the various castles of the Bavarian crown have contributed ceilings, windows, wainscots, etc., and in some cases the rooms have been planned specially to receive these. The museum contains an almost endless number of specimens, large and small, of domestic art of the country in all ages; of wardrobes, caskets, iron utensils, beds, tables and chairs, the supply seems inexhaustible, and nearly all of them are in their original state. The Bavarian Museum neglects nothing which is of any historical interest, and is, in consequence, one of the most complete of its kind to be found in Europe.

Engineering Notes.

Glass factories in Germany now number 400, and the works give employment to 35,000 men.

The new waiting room of the Grand Central station has been opened to the public, and it is one of the finest rooms of the kind in the country.

The great Galerie des Machines is to be cleared away after the Paris Exposition. It is so large that it cannot be readily utilized for exhibition or other purposes.

A spiral chimney, 150 feet high, has been built near Bradford, England. The chimney is square in cross-section, and each layer of brick is shifted three-sixteenths of an inch out of place, thus giving a peculiar twist to each side of the stack.

The Gas Committee of the Manchester City Council, England, has appointed a special subcommittee to consider and report as to the desirability of recommending the council to purchase a coal mine. Nearly 500,000 tons of coal or cannel are annually carbonized at the corporation's gas works, and an advance of $1.25 per ton on the new contracts would entail an increased annual outlay for the raw material of gas manufacture of $500,000 for the current year.

The General Society of Mechanics and Tradesmen of New York city has added to its library a department of trade catalogues. These will be indexed and filed away and will be accessible at all times to those who wish to consult them. This is an excellent idea, and all public libraries should do the same, as the information which is frequently given in trade catalogues is of the utmost importance and represents the very latest practice, which cannot be obtained elsewhere.

The railroad bridge at Galveston has been restored, the work being completed twelve days after the storm. It was 2⅛ miles long, and most of the piles were found standing, says The Railroad Gazette, except at the draw opening, and where a large vessel was blown against the bridge in a storm. Considerable of the material for the new caps and flooring of the bridge had to be delivered on rafts, the track and roadbed having been destroyed for about 8 miles north of the terminus of the railroad at the bay.

A clever engineering feat has recently been accomplished at the Agecroft coal mine, not far from Manchester. This colliery is the second deepest in England, the shaft extending to a perpendicular depth of 2,175 feet. During the erection of the necessary machinery, three immense boilers were lowered down the shaft in a complete condition. This is the first occasion upon which boilers have been installed in this manner, since previously they have always been sent down the mine in pieces and then fitted together.

According to a German contemporary, artificial slate is tin-plate coated with a mixture of finely ground natural slate, lampblack, and a solution of water glass. The soluble glass solution is prepared by finely powdering 1 part by weight of solid potash water glass and 1 part of soda water glass in a mortar and pouring over this 12 parts of soft or distilled water; after boiling 90 minutes, the water glass dissolves completely. Seven parts of slate ground with water to an impalpable pulp are mixed with 1 part of lampblack and added to the water glass solution; the rather stiff mass which results is brushed upon tin plates previously roughened with sandstone.

A diamond circular saw for cutting stone is described in London Engineering, and is said to cut hard sandstone blocks at the rate of five feet per minute. The saw has dovetailed recesses in which are fitted steel blocks, each containing a diamond. A hole is drilled into the block, but stopped before running through. A diamond is dropped into the hole, and a steel wire peg driven in behind it. The block is then put in an electric welding machine, and when it is softened, pressure is applied until the diamond is firmly gripped and the steel peg is welded into place. The front of the block is then filed away until the diamond is exposed, and the sides are milled to fit the dovetailed recesses in the saw. The positions of the diamonds in the blocks vary, so as to enable the saw to clear itself in making the cut.

The Swedish State Railways have recently placed a steam ferry at Copenhagen for the purpose of carrying on the trade between that port and Malmo. The vessel has been constructed at the Kockum Shipyard at Malmo and cost $250,000. The boat is a screw steamer 268 feet in length by 52½ feet beam, and is capable of steaming 13¼ knots per hour. The vessel is built of steel, and is an ice breaker, so that she may be able to force her way through the heavy and thick ice floes with which the channel is covered during the winter. The displacement of the boat when loaded with 18 railway cars is 1,600 tons, while she has accommodation for 900 passengers. There is an extensive deck, 150 feet by 46 feet broad, amidships. The vessel is illuminated with electric light throughout, and comfortably appointed. Should this vessel prove successful, several other similar type of craft will doubtless be placed upon this service, in order to deal with the rapidly developing traffic between these two places.

Electrical Notes.

A telegraph line has been completed between Seattle, Washington, and Skagway, Alaska.

Some experiments have been conducted at St. Paul, in which electricity at a pressure of 30,200 volts was sent through an underground cable three miles long. The highest voltage formerly obtained was 20,000. The cable consists of three copper conductors, each being inclosed in a paper tube, the whole incased in lead and drawn through vitrified conduits. The cable is a part of the system by which the gas light and power company will utilize the water power of Apple River, Wis., the other 24 miles of wire being overhead.

An electrically operated interlocking switch and signal plant is to be installed at Sixteenth and Clark Streets, Chicago. Electric motors and solenoids will be used for switches and signals. The semaphores will be operated by electric motors of ⅛ horse power, while the dwarf switch signals will be worked by solenoids. The switches will be thrown by one horse power motors. The system is said to work particularly well, as bad weather has less effect upon this system than it has upon mechanical or electro-pneumatic operated plants.

Marconi has made many new improvements in wireless telegraphy, and has now done away with the masts in certain of his experiments. He began as long ago as last January work on the cylinder plan, and he has already telegraphed 60 miles with a cylinder 4 feet high, instead of a mast and wire 125 feet high. The essential arrangement in working the cylinder plan is not greatly different from that of the aerial wire. The transmitting instruments are practically the same, a battery, induction coil, earth wire, etc., being used. The only change in this part of the apparatus is the introduction of resistance coils where needed, and an arrangement for sending "tuned" messages. The cylinder rests upon a table. Marconi has devised methods by which a number of installations may be worked together in the same room or building.

When a battery of cells is used as a source of electric energy, the constant element in the circuit is the E. M. F., while the current depends upon a variety of external conditions. The case is reversed on using an influence machine driven at a constant speed, for then the mean current is the constant element, while the E. M. F. is a dependent variable. This fact has been utilized by M. Toepler for investigating the continuous discharge in air at atmospheric pressure as dependent upon the current. This continuous discharge may appear in four different forms, viz., glow, brush, brush arc, flame arc. All of these may appear both at the positive and negative electrodes, but to simplify matters the author takes care nearly to suppress the effects at one electrode by covering it with a flat bad conductor such as a slate. He is thus enabled to study the effects at the two electrodes independently. As a general rule, an increase in the current strength brings about a transition from the glow to the brush, and finally to the brush arc. But this transition is not continuous unless the capacity in the circuit is negligible. Otherwise the three continuous stages are separated by stages of discontinuous spark discharge; and as the capacity increases, the discontinuous stages encroach until the brush arc is almost entirely eliminated. Finally, the author deals at length with two forms of natural continuous discharge, viz., St. Elmo's fire and globular lightning.—M. Toepler, Ann. der Physik, No. 7, 1900.

There has just been introduced in the East End of London an enterprising system of selling electric light. The districts embodied are Poplar, Bromley and Bow, three of the busiest and most thickly populated localities in London, inhabited by the artisan class. The streets in this part of the metropolis have always been poorly lighted, but now they have been supplanted by large electric arc lamps. Altogether 195 arc lamps have been installed throughout ten miles of streets, but this is to be increased in the immediate future. The light is to be supplied to the inhabitants at such a low price that it will be cheaper for the working classes to avail themselves of electricity than the gas for lighting purposes. Then, again, the light is to be installed in the dwellings free of cost to the residents, so that actually the tenants have only to pay for the amount of electricity consumed. This scheme was first projected so far back as 1893. The tariff for consuming the light is extremely moderate and should recommend the universal utilization of this cleaner, cooler, and more efficient illuminant. For light consumption it will be supplied at 6 cents, 8 cents and 10 cents per unit, while for motive power it will be supplied at the purely nominal costs of 3 cents and 6 cents per unit. The present cost of the gas is 68 cents per 1,000 feet, and as about 5 units of electricity is equivalent to 1,000 feet of gas, there is a considerable difference between the cost of the gas and the electricity. When the installation has been completed, 65 miles of streets will be lighted by the electric lamps, and the houses corresponding to the same area of streets will be in a position to avail themselves of the electric light. The installation has cost about $500 000