were to design its own ships and embody in them all the experience which has been gathered in the Spanish and Philippine wars. In conclusion, we are glad to be able to state that letters have been received by Major Devol from both officers and men on their arrival at Manila, stating that the system of accommodation as carried out on our transports is very successful, and that the spaces devoted to sleeping accommodations for the men had, indeed, been found to be, in the tropics at least, the best ventilated and most comfortable portions of the ship.

Automobile News.

After a two-year struggle with Chicago's bad streets the Illinois Electric Vehicle Company, operating a hundred auto cabs, has decided to go out of existence. Word to the effect that the directors of the cab company would recommend the winding up of the company early next month was given out. The directors say that at the present time Chicago is not ready for modern improvements in the way of electric cabs.

The road which has been in construction for some time past in Madagascar, from Tananarive to the coast, has recently been finished, and this will give a new impetus to affairs in the colony, especially in the matter of transportation, as formerly all the goods brought to the capital were taken across the country by native carriers. The opening of the road will no doubt be followed by the use of the bicycle and the automobile. A number of different transportation enterprises are now on foot, and several of these are to use automobile systems. It may be remarked that the last 40 miles of the road, which was laid through the forest, was finished in the space of three months by a force of 25,000 men.

The London Electric Omnibus Company, in its last council meeting, decided to adopt an electric omnibus system in preference to traction by electric tramway. The report concludes by demanding of the stockholders the amount necessary for the construction of three hundred omnibuses of small pattern, the price of each being estimated at $2,200. The total of $660,000 thus furnished will equip the system on a large scale. London is thus taking the lead in the question of electric omnibus traction, following the example of Berlin, the only city of Europe where the electric omnibus has come into use to any extent. The latter, it will be remembered, have been constructed by Siemens & Halske, and work with accumulators in most of the streets, using the trolley wire when they pass along the line of the tramway.

A number of automobile tours are being organized for the coming season. Among these may be mentioned the tours of England, Italy, and Belgium. The tour of Belgium, as organized by the Automobile Club, will consist of seven stages; it is to be held in the latter part of July. The seven days of the tour include the following routes: First day, Brussels—Malines—Antwerp, 26 miles; second day, Antwerp—Liège, 75 miles; third day, Liège—Spa, 30 miles; fourth day, Spa—Namur, 45 miles; fifth day, Namur—Charleroi, 25 miles; sixth day, Charleroi—Ghent, 66 miles; seventh day, Ghent—Ostend, *via* Bruges, 35 miles. The prizes will include gold, silver, and bronze medals, besides a prize of $800. At Ostend, the terminal point of the excursion, will be organized a series of races, as well as an automobile exposition.

The Automobile Club of France has finally decided upon the three champions who are to represent it in the International Cup race. These are Charron, Levegh and Girardot. Charron won the cup last year, and has besides made many notable records. In 1897 he won the Paris-Dieppe race, and in 1898 the Paris-Bordeaux over René de Knyff; he also gained the Paris-Amsterdam race of that year. In 1899 he was victor in the Paris-Bordeaux race, and made the record in two stages of the Tour de France. Last year he was second to René de Knyff in the Nice-Marseilles race, but won the Gordon Bennett Cup over the latter and Girardot. It will thus be seen that his career has been a successful one. Levegh commenced to make his record in 1898 in the Paris-Amsterdam race, where he was seventh, but in 1899, with a four-cylinder machine, he won the last stage of the Tour de France, from Nantes to Cobourg. Shortly after he came out first in the Bordeaux-Biarritz race. In September, 1899, he made a dead heat with Girardot for the first place in the Paris-Ostend, beating Charron and Lemaitre, and in the Paris-Boulogne was second to Girardot. Last year he won the coast race, Nice-Turbie, and the mile dash at Nice, and carried off the honors in the Paris-Toulouse, the great race of the year. Girardot was called for a long time the "eternal second," as, in fact, he was second in most of the 1898-1899 races. He carried off his first victory in the Paris-Ostend, and then in the Paris-Boulogne, after having been second in the Tour de France and the Paris-Amsterdam. He won the Périgord Cup and was second in the International Cup race. It will be seen that the Automobile Club has made a wise choice of the defenders of the cup for this year.

Correspondence.

The New Armored Cruisers.

To the Editor of the SCIENTIFIC AMERICAN:

During the past few years I have been greatly interested in naval matters, and of late I have been particularly interested in the correspondence relative to our new armored cruisers of the "California" and "Maryland" types which has been published in your issues of February 9 and 16 and March 2. It would certainly seem that, in view of their great size, these ships are deplorably weak in battery power. To remedy this defect, your correspondents have suggested the addition of four 8-inch guns to their present battery of four 8-inch and fourteen 6-inch rapid-firers. While the adoption of this plan would successfully overcome their inferiority in offensive power, it would also necessitate the entire re-arrangement of their 6-inch and secondary batteries, with the possible sacrifice of some of the 3-inch rapid-fire guns. This would occasion a re-apportionment of weights and changes in design which. on consideration of the fact that the contracts for these ships are already (or about to be) signed, might be undesirable.

Would it not be a better and simpler plan to substitute 7-inch rapid-fire guns in place of the 6-inch rapid-firers? This would involve slight modifications in the gun positions, a reduction in the number of rounds of ammunition per gun, and an increase in the total displacement of the ship, but the enormous increase in muzzle energy would more than offset these inconveniences. Although there is no 7-inch gun in existence in our navy at present, I notice by your issue of December 22, that there is an experimental gun in process of construction. As it will be two years and a half before the batteries can be installed on these new cruisers, there will be ample time for the Bureau of Ordnance to ascertain the merits of this gun by practical tests, and commence the construction of others.

The details of the 7-inch gun are unknown to the writer, but it would not be unfair, it seems to me, to assume that its projectile will weigh about 175 pounds, and that the combined weight of gun and mount will not exceed that of the 6-inch gun by more than 10 tons. These dimensions are adopted arbitrarily as a result of observing the data of the 7.5 Vickers-Maxim rapid-fire gun, a description of which was published in your issue of January 12. On our new cruisers, 140 tons is allowed for the 6-inch ammunition supply, at the rate of 200 rounds per gun. Thus, the substitution of 7-inch rapid-firers for the present battery of 6-inchers, with the reduction of the ammunition supply to 150 rounds per gun, would make an increase of about 44 tons in weight of ammunition, and 140 tons in the weight of the guns and mounts, or 184 tons in all, a comparatively small item in a 13,800-ton ship. Also, a gun firing a 175 pound projectile at a velocity of 2,900 foot-seconds, or more, would be as much superior to the 6-inch gun as the 6-inch rifle is to the 5-inch, both in penetrative and destructive power.

There is no cruiser afloat to-day which could stand up before the tremendous amount of energy concentrated in a battery of four 8-inch and fourteen 7-inch rapid-firers, and even the new Italian ships (whose design calls for a battery of twelve 8-inch rapid-firers) would find their match in the "California." At some time in the near future, the many improvements in the resisting qualities of armor of moderate thickness will render the 6-inch weapon useless at the ordinary battle ranges. Indeed, I understand that it is with a view of meeting such a contingency that the 7-inch and 7.5-inch guns have been designed. Why, then, do we not follow the principles of the old maxim, "An ounce of prevention is worth a pound of cure," by forestalling the contingency? Why do we not hold true to our traditions of the War of 1812 by placing our new cruisers in the same relative positions as our famous old frigates which carried 24-pounders where their opponents carried 18's? Why, in the name of common sense, do we not build ships which will carry heavier batteries than those of 4,000 or 6,000 tons less displacement which were designed three or four years ago? If fighting is the primary object of a warship, it would certainly seem that her offensive power should not be made of secondary importance to other qualities in her make-up.

Your correspondents complain, and justly, that a deplorable deficiency in offensive power is also to be found in the semi-armored cruisers of the "St. Louis" type. Could not their defect be remedied in the same manner as that suggested for the "California" and "Maryland" types? It is earnestly to be hoped that our naval constructors will see fit to bring these fine ships up to the superior standard of excellence which they have attained in the latest battleships.

The events of the last three years have heightened public interest in the navy to an unusual degree, and I am sure that a large number of your readers are keenly interested in the naval information which appears in such generous quantities in your columns.

PAUL D. EMMONS.

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Engineering Notes.

A controversy over the asphalt lakes in Venezuela has been adjusted and the case will be heard in the local courts.

The Metropolitan and District Railways of London have suffered severely owing to the competition of the omnibuses and the Central London Railway. They have been losing at the rate of $7,000 a week for the last half year, and the District Railway has decided to adopt electric traction. The change can be effected at a moderate cost and in a short time. The directors have been given full power to raise additional capital.

There was a substantial increase in the traffic through the Suez Canal in 1899. Three thousand five hundred and three vessels passed through the canal in 1898; in 1899 the number was increased to 3,607, representing an increase of 104 vessels and a gain of 657,017 tons. The average time consumed in passing through the canal in 1899 was eighteen hours and thirty-eight minutes, about half an hour longer than was necessary during the previous year.

The consumption of ice in Brazil is constantly increasing. This is due principally to the demand for ice in restaurants, hotels and other public places. Foreigners are most insistent in their calls for ice. Our consul at Santos is of the opinion that an ice company would prove a profitable undertaking in that place, the use of ice being practically unknown in the fish, vegetable and meat markets. He also thinks the American refrigerator would sell well in Brazil.

The first stone bridge with ring stones built in the United States is claimed by the town of Ipswich, Mass. It was built by the town and county in 1764. The builder was Col. John Choate. There are two spans, each of 28 feet. When the time drew near for the falsework to be removed the inhabitants of the town became greatly excited, and people thought it would not stand its own weight. Col. Choate had his horse ready to take him out of the country if the bridge fell. The falsework was successfully removed, however, and the bridge still stands, although it trembles a little with a heavy team. It was widened in 1838.

It is proposed to renovate London Bridge at a cost of $500,000. The footways are to be widened from their present width of nine feet to fourteen feet. A new granite corbeling is to be provided; the parapet will be reconstructed upon an open design so that the dust may escape into the river below; and the center of the bridge is to be brilliantly illuminated. The question arose as to whether the existing foundations of the structure would be sufficiently strong to support the suggested additions, but the report of Sir Benjamin Baker, who made a careful survey of the bridge, is affirmative. It is proposed to carry out the work immediately. When the Tower Bridge was opened, it was generally considered that the new means of communication between the north and south sides of the river would considerably relieve the stress of traffic over London Bridge, but the decrease in the traffic over the latter bridge is scarcely appreciable.

A new English port of call is to be established at Dover for the transatlantic liners plying between New York, Germany and Holland. The scheme has been in embryo for several years, but the construction of necessary accommodation for the vessels, in which the port is at present deficient, would have entailed such a heavy expenditure that it was abandoned. Since the Admiralty Department commenced operations upon an immense national harbor, the contract for which amounts to $20,000,000; and have notified the municipal authorities that the Admiralty pier, which is at present used as a landing stage for the steamers plying across the Channel, will be required for national purposes; and that there was considerable danger of the shipping trade of Dover being transferred to another port containing better accommodation, it has been decided to carry out immediately the construction of docks, piers, warehouses, etc. A new pier for the berthing of the steamers is to be erected and will be completed in about four and a half years' time. It will extend parallel with the present Admiralty pier, and will be 1,600 feet in length, and 350 feet in width. There will be eight sets of railway tracks to provide accommodation for ten or twelve trains at a time, and there will also be four landing stages for the steamers. The pier for its entire length will be covered, thus converting it into an immense railway station. The building of this part of the work alone will amount to $1,110,000. A pier has just been completed at a cost of $2,750,000. An extensive commercial dock with quay space extending to 14 acres, which is in course of construction, and which will provide berthing accommodation for vessels of the proportions of the "Oceanic," will cost $6,250,000.