

Correspondence.

Lightning Protection.

To the Editor of the SCIENTIFIC AMERICAN :

Referring to the excellent article by Mr. Hopkins on "Lightning Protection" (SUPPLEMENT, March 25, 1899, page 19434), I beg to suggest that a protection fulfilling all the indications may be very cheaply arranged on a country house by nailing a few lengths of common barbed wire to the roof and bringing the ends to a point where they can be twisted around the iron pump of a driven well.

This gives an enormous number of points and a perfectly adequate water connection. The device was used many years ago by the late Dr. Henry J. Bigelow, of Boston, for the protection of a small isolated wooden house at Nantucket, and has apparently been perfectly effectual.

W. S. BIGELOW, M. D.

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German Steel Arch Bridges.

To the Editor of the SCIENTIFIC AMERICAN :

Your issue of March 25 will be read with great interest by all civil engineers interested in the introduction of bridges that will be more æsthetic in their design and still retain their stability, etc.

For the beautiful illustrations of the two bridges across the Kiel canal (Holstein, Germany), at Levensau and Grüntenthal, you will have the acknowledgment and thanks of the entire profession.

As to the credit due in designing these bridges, I believe Mr. Müller v. d. Werra is in error. The bridge at Grüntenthal was designed by Mr. Claus Greve, C.E., an assistant to Mr. Föltsch, chief engineer of the said canal and of late one of the commissioners appointed to examine into the practicability and cost of the Panama canal.

For above work Claus Greve received recognition and a decoration in person, during the time of its inauguration, by the Emperor of Germany.

H. ROHWER,
As. Eng. Mo. Pac. Ry.

Sedalia, Mo., April 6, 1899.

[Our correspondent is in error in supposing that the credit for designing the Grüntenthal bridge was given, in the article referred to, to Prof. Krohn, the designer of the Levensau bridge. We are obliged to Mr. Rohwer for supplying us with the name of the designer of this notable structure, which was inadvertently omitted from the article.—ED.]

Twelve-pounders Better than Six-pounders for the Maine.

To the Editor of the SCIENTIFIC AMERICAN.

The description of the new battleships of the "Maine" class, recently given in the SCIENTIFIC AMERICAN, discloses the fact that they are to continue a feature for which our ships are already notorious—namely, the lack of a sufficient number of small rapid-fire guns. To give a first-class battleship, in the year 1899, a secondary battery composed of twenty-four 6 and 1-pounders seems incredible, especially in American ships, which have always had at least the reputation of a heavier armament for their size than any afloat.

The small rapid-fire gun has shown its value more and more every year. In the battle of the Yalu it did a great part of the execution on both sides. At Santiago the 6-pounders were responsible for a large proportion of the total damage inflicted. At Manila, the sweeping of the decks by these small guns contributed largely to the wretched showing made by the Spanish gunners. Moreover, at Santiago the two Spanish destroyers were principally demolished by the fire of these small rapid-firers.

Here are the three important battles so far fought with modern vessels, and in each of them the rapid-fire gun has played the predominant part.

There is also another event in which the ship's safety will depend almost entirely on the small rapid-fire guns—namely, a night attack by a torpedo boat fleet. Here every rapid-fire gun will count and the ship lacking them is sure to suffer.

A table comparing the "Maine" with representative foreign ships will be found somewhat startling.

Name.	Tons.	Armament.
Maine	12,500	Four 12 in., sixteen 6-in., twenty 6-pr., four 3-pr., four 1-pr.
Retwisan.....	12,700	Four 12-in., twelve 6-in., twenty 12-pr., twenty-eight smaller.
Tri Sviatetelia..	12,840	Four 12-in., eight 5-9 in., four 4-7-in., fifty-six smaller.
Majestic.....	14,900	Four 12-in., twelve 6-in., eighteen 12-pr., twelve 3-pr., 8 m.
Bouvet.....	12,200	Two 12-in., two 10-8 in., eight 5-4 in., eight 3-9 in., twelve 1-8 in., twenty 1-4 in.
Kaiser Wilhelm II.	11,130	Four 9-4 in., eighteen 5-9 in., twelve 18-pr., twelve 1-4 in., 8 m.
Italia.....	14,387	Four 10-4 in., eight 6-in., four 4-7 in., twelve 2-2 in., twenty-four 1-4 in., 2 m.
Asahi.....	15,200	Four 12-in., fourteen 6-in., twenty 12-pr., eight 3-pr., four 2-1/2-pr.

The average number of rapid-fire guns on foreign ships is seen to be over forty. Compare with the "Maine" the Russian ship now building at Cramps,

the "Retwisan," or the "Majestic," of the English navy. The "Retwisan" has nearly twice as many small rapid-fire guns as the "Maine," guns, moreover, of much greater power, consisting chiefly of 12 and 3-pounders, instead of our 6 and 1-pounders. The "Majestic" also shows this same superiority.

As is well known, the 3-pounder has a much greater range than the 1-pounder, and, of course, the 12-pounder is manifoldly more powerful than either. The 1-pounder is notorious for its short range, so short indeed that the gun would be seldom in range at the distances which modern artillery compels.

In the matter of small rapid-fire guns alone, both the "Majestic" and "Retwisan" are decidedly superior to the "Maine." The argument is made that the "Maine's" four extra 6-inch guns equalize the batteries; but no reason is apparent why our ships should not have a reasonable number of the small guns also.

The 6-inch guns on the upper deck of the "Maine" might be placed farther apart, forward and aft on each side, as in the "Canopus," so as to allow several smaller guns to be placed in the interval between them. Then, also, the two 6-inch guns would be in less danger of being put out of action by a single shot. Several small guns could also be placed on the boat deck. There is room for at least four more of these there, without interfering in any way with the boats.

Many foreign ships are overgunned. Possibly the Russian vessel now building at Cramps, the "Retwisan," has more guns than can be carried advantageously. The English, however, have always been extremely conservative in this respect; sometimes they have gone to the other extreme of undergunning their ships; but the constant feature of English ships, which may be always depended upon, is the reasonably small number of their guns.

Why, therefore, should the "Maine" carry twenty-eight of these all-important guns when the "Majestic" has thirty-eight—thirty-eight, moreover, of greatly superior power?

Why do we so completely ignore the lessons of the Spanish war, and drop our old tradition, its value so often proved, of well-gunned ships? L. F. B.
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[Our correspondent does not realize the enormous difference in power which results from increase of caliber. The four extra 6-inch guns on the "Maine" represent in their destructive power much more than the difference between the twenty 6-pounders of the "Maine" and the twenty 12 pounders of the "Retwisan."

However, his argument is on the whole well made; for it is officially stated that the 6-pounders will be replaced by 12-pounders before the ship is launched.—ED.]

The Telephone in the United States.

According to the annual report of the American Bell Telephone Company, last year 1,231,000,000 messages were sent. The company now has under rental 1,124,846 instruments. This is a gain of 205,725 during the year. On January 1 there were 1,126 exchanges, 1,008 branch offices, and 772,989 miles of wire. There was a total of 338,293 circuits, 19,668 employes, and 465,180 telephone stations. The estimated number of exchange connections daily in the United States by last account was 3,823,070. The cost to subscribers varied from less than 1 cent up to 9-4 cents per connection. These figures are of great interest when taken in connection with similar statistics of telephone service abroad. In 1898 the Bell Telephone Company had, as already stated, 465,180 exchange stations, while in Germany in 1897 there were only 173,981; in France, 45,000; in all of continental Europe, 453,844; in Great Britain and Ireland, at the end of 1898, 103,084.

Wireless Telegraphy.

The French government has commissioned Signor Marconi to install his apparatus experimentally on a cruiser. If the experiment proves a success, several French warships will be provided with the apparatus. The storm test of the Marconi system has been made, the wind blowing a gale in England and the rain storms were constant. Similar conditions prevailed at Boulogne, but the messages passed as readily and as distinctly as though the water was calm. Signor Marconi states that he thinks of coming to the United States in October to execute several commissions for fixing his apparatus between various towns.

The Cancer Microbe.

The Paris Figaro has announced that Dr. Bra has found the microbe of cancer, and that there is reason to hope that the discovery may soon lead to a certain cure of that dread disease. Dr. Bra is modest and cautious in his statements, saying that it must be months before a definite announcement would be possible. What he has succeeded in doing, however, is to isolate and cultivate a parasite from cancerous tumors and to produce therefrom cancer in animals. The parasite is fungus-like and is certainly the specific agent of cancer. Dr. Bra has spent some four years in his researches on the origin of cancer.

Science Notes.

Mr. L. W. Longstaff, a Fellow of the Royal Geographical Society, has donated \$125,000 to the Society for the purpose of equipping a British Antarctic expedition. It is thought probable that the vessel to be fitted out will co-operate with the German expedition.

The Council of the British Association has selected Sir William Turner, F.R.S., professor of anatomy in the University of Edinburgh, as president of the Association for the Bradford meeting, which is to be held next year.

The Soudan bridge order which was given to a Pennsylvania firm is creating a great impression in England and has awakened bitter opposition. Some of the newspapers go so far as to say that the transaction was scandalous and that the specifications were altered in favor of the American contractors. This is denied by the builders of the bridge.

The Russian ice breaker "Ermak," which was designed by Admiral Makaroff, has reached Kronstadt, crushing the ice with ease. When the island of Sescar was sighted, large floes of ice varying in thickness from 9 to 10 feet were met with. The ice was broken into large pieces which floated astern, but so arduous was the task of getting through the solid mass that the rate of progress was but 2 1/2 knots an hour.

There is a remarkable collection of astronomical photographs at Harvard University. They are kept by Mrs. M. P. Fleming, who is curator. The photographs taken at Cambridge and Arequipa are preserved and arranged in catalogues as is done with books, but the plates themselves are actually preserved, because no paper copy can repeat all the minute accuracy of the original negative on glass, and prints are not taken from them for scientific use, but only for illustration. If one is destroyed, it cannot be replaced. So it necessitates the greatest possible care in preserving them.

There is now an excellent chance of Boston having another Subway. The Committee on Metropolitan Affairs of the Massachusetts Legislature has given a hearing to the proposition of the Mayor for another Subway. The proposed route extends parallel with the Charles River on the Boston side and involves the tunneling of Beacon Hill. It is proposed to connect the new Subway with the existing Subway at Scollay Square. The cost of the new project is estimated at \$3,000,000.

A special messenger of the American District Telegraph Company was recently sent by Mr. Richard Harding Davis from London with a letter to New York, one to Philadelphia, and one to Chicago. The boy was sent by the novelist in an effort to beat the Postal Union mail service, and this is undoubtedly the longest trip on record which a district telegraph boy has ever made. He is known at home as messenger No. 757; he is thirteen years old and rejoices in the name of Jagers.

Mr. Jeremiah Head died on March 10. He was one of the best known consulting engineers in England. His paper read before the Institution of Civil Engineers in 1896 on the American and English methods of making steel plates, and a paper which he contributed in February to the same Institution in connection with his son on "Lake Superior Iron Ores," were a revelation to a large number of people in Great Britain who had not realized how rapidly Americans were forging ahead in the production of iron and steel, and the many improvements that had been introduced in transatlantic practice.

A task which has been undertaken in the interest of commerce was begun by the voyage of whalers to the Arctic Ocean, to test the Arctic currents. The effort to secure facts about the current and of the existence of a circular polar current was inaugurated by the Geographical Society of Philadelphia, backed by the United States government. Fifty patent casks of a peculiar make have been constructed in San Francisco, and will be sent out in the United States revenue cutter "Bear" and vessels of the whaling fleet. They will be distributed in different parts of the ocean and will be picked up by vessels which pass them later. It is thus hoped to determine the currents of the Arctic and the theory of an open current around the pole from the Atlantic to the Pacific.

Recently a curious sight was seen on Center Street, New York, when the old water tank of the Manhattan Company was exposed to view. April 2 was the centennial anniversary of the bank of the Manhattan Company. It was incorporated in 1799 for the purpose of supplying the small city with water. The real motive, however, was to organize a bank in opposition to the Bank of New York. In order to keep its charter, the company must supply water; so that the old tank has been kept in working order and the engine has been kept going pumping water. The tank is 40 feet in diameter. In 1840 the company had about 25 miles of wooden pipe and 14 miles of iron pipe. At about that time its usefulness as a water supply ceased and the Croton system came into use. From time to time these wooden and iron pipes are unearthed.