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THAT ATHBARA BRIDGE CONTRACT.

Further particulars that have come to hand regarding the letting of the contract for the Athbara bridge in the Soudan to an American firm, are of great interest as showing the rapidity and cheap cost at which our bridge companies can undertake to lay down material, as compared with foreign competitors. Late last year the British government decided to complete a railroad bridge across the Athbara River, a large tributary of the Nile that is intercepted by the military railroad now building through the Soudan. It was determined to complete the bridge before the floods of July, 1899, or within a period of six or eight months. The designs and specifications were drawn in London and bids were solicited from both British and American firms. The American bids varied from $52 to $65 per ton and the time of delivery was in each case two months and a half, while the lowest British bid was $68 per ton and the highest $80.50 per ton, the time of delivery varying between three and a quarter months and six months.

When the design and the bids were received in Egypt on December 28, it was discovered that the bridge, as designed, did not admit of being launched from the piers, but would have to be erected on false work. The character of the river was such that it would have taken two years instead of six months to build the bridge upon false work. As time was a matter of supreme importance, a telegram was sent to the two English firms that had promised the earliest delivery, asking how soon they could supply a bridge of a type suitable for launching, and promising a premium for early delivery. It was found that no supply could be obtained under six months. Inquiries were also made in America as to how soon a bridge of standard American design could be supplied, and a wire was at once received that a bridge could be delivered on board at New York in six weeks.

A contract was signed on January 30 of this year; the seven spans were completed in thirty-seven days, or five days earlier than the contract date of March 8, and the complete bridge was on its way to Liverpool by March 15. It was due at Alexandria about April 15, and it is expected that it will reach the site by May 15, or a few days before the piers have been completed. The structure will be bolted together temporarily for launching across the piers, and riveted up subsequently. It is now probable that the whole bridge will be in place by the first day of July, when the Nile floods are expected. It will thus be seen that the expeditious methods of the American firm will enable trains to be running across the Athbara River one month earlier than the English builders could have placed the material on board ship in an English port. Comment on these very remarkable comparisons is unnecessary.

WIRELESS TELEGRAPHY ACROSS THE ENGLISH CHANNEL.

The recent experiments of Marconi in telegraphing without wires across the English Channel have entirely removed his work from the region of mere experiment and established it among the practical and extremely useful inventions. The main facts of the recent test are already familiar to our readers and require no reiteration here, but we wish to draw attention to the fact that we publish in the current issue of the SUPPLEMENT illustrations of the terminal telegraphic station at Wimereux, on the French coast, which cannot fail to be of extreme interest. One of the photographs from which the illustrations are made shows the terminal steel mast or rod with its guys in position, erected on the beach in front of a small villa, in one of the front rooms of which the receiving and transmitting apparatus is located. Another of the photographs shows the interior of the room and two of Marconi's assistants engaged in receiving a telegram from the English coast, thirty miles distant. Messages are dispatched with perfect freedom from the vertical mast on the French coast to that on the English coast, and vice versa. At the time that the photograph was being taken the "Cassini," with M. Lockroy, Secretary of the French Navy, on board, passed down the Channel within view of the French coast. The assistants on noticing the ship transmitted the news across the Channel, and in less than a minute a reply was received, "If the secretary comes to see you, give him a good reception." The Morse receiver is used, and the message is written on the tape in the usual dots and dashes of the Morse code. In view of the large amount of visionary speculation that has been indulged in by some of the investigators of wireless telegraphy, there is something decidedly refreshing in the businesslike methods and practical results which have characterized the work of this brilliant young Italian.

SINE-WAVE TELEGRAPHY.

The system of sine-wave telegraphy invented by Messrs. Crehore and Squire was recently made the subject of a long-distance test, in which the remarkable feat of transmitting 120,000 words an hour was accomplished. The experiments were carried out under the direction of Gen. Greely, chief of the Signal Service, between Fort Myer, Virginia, and the War Department, Washington. Kipling's celebrated poem, "The White Man's Burden," was transmitted back and forth continuously between these points for the space of an hour, and it was found that the total number of words dispatched was 120,000, a rate of 2,000 to the minute. In the matter of speed and distance, this test has been exceeded by one carried out by the inventors in October, 1898, when they reached a speed of 3,000 words a minute over a cable between New York and Canso, Nova Scotia.

The sine-wave system makes use of the regular telegraphic wires. The telegraphic characters are punched in a paper tape, similar to those used in the stock tickers, and the tape is fed to a transmitter, which, by an ingenious application of the principles of the alternating current, sends messages with extraordinary rapidity to a polarizing receiver, in which, by means of a rotating photographic plate, the message is reproduced. At the time of the earlier experiments we devoted considerable space to the subject, and the reader is referred to the SCIENTIFIC AMERICAN SUPPLEMENT for May 8 and 15, 1897, and March 19, 1898, for complete illustrations of the apparatus, and a lengthy description by the authors of the system.

OFFICIAL TEST OF THE NEW ARMY WIRE GUN.

The United States army is testing the wire-wound principle of gun construction on a scale and with a thoroughness which will settle the value of the system one way or the other to the satisfaction of all parties concerned, whether lay or professional. The trials, as far as they have gone, are strongly in favor of the system, and unless some mishap occurs before the specified number of rounds has been fired, the army will be in possession of fifty of the most efficient guns, for their weight, in this country, and certainly the strongest guns that have ever been turned out in the history of the art of gun construction.

One of the chief objects of constructing guns by shrinking hoops or winding wire upon an inner tube is to throw all the metal of the gun into a condition of initial strain, or in other words, to compress the interior metal and stretch the exterior metal. By thus wrapping the metal tightly around the bore, as it were, the pressure of the powder at the instant of firing is felt and resisted by every particle of metal in the gun. In a finished built-up gun the metal at the bore is in compression, and that at the circumference in tension, the strains passing from compression to tension, with a neutral point somewhere midway in the body of the metal. The greater the compression at the bore, the stronger the gun, other things being equal. There is a limit, however, to the allowable compression, for if we shrink the hoops or wind the wire too tightly, the metal at the bore will be injured. We must not compress it beyond its elastic limit, and hence we see that the strength of the built-up gun is primarily dependent upon the elastic compressive limit of the metal at the bore. In the common type of built-up gun the core upon which the hoops are shrunk is a forged tube of steel; and while it is possible by careful work in forging and tempering to bring the steel up to a high standard of elastic compressive strength, this tube steel does not by any means represent the highest elastic limit that can be produced by special methods of work on steel in other than tubular shapes.

It occurred to Mr. J. H. Brown, the inventor of the wire gun now under consideration, that if a tube were built up of separate longitudinal segments, it would be possible to subject them to a cold-drawing process and secure the extraordinarily high elastic qualities which result from cold work. Under his system a number of flat tapered bars of open hearth steel are cold-drawn to such a width, thickness, taper, and length, that when assembled and clamped together they form a tube answering to the forged tube of the ordinary gun, but possessing vastly greater qualities of resistance. Upon this segmental core the wire is wound at a certain tension, until the desired degree of compression of the core is reached. The core serves merely to receive and carry, as it were, the accumulated tension of the successive windings of the wire, so that when the gun is fired the pressure may pass through the core (which, of course, has no power of tangential resistance) and be immediately resisted by the wire. The high quality of steel that can be secured in this type of gun was shown in the tests of the metal put into the first gun of the type tested by the army officials, the segments showing an elastic strength of 126,000 pounds and a breaking strength of 176,000 pounds to the square inch, while the respective figures for the wire were 230,000 pounds and 262,000 pounds to the square inch.

The excellence of this system of construction is shown in the ballistic figures of a 5-inch segmental gun tested a few years ago at Sandy Hook with brown powder, when 216 rounds were fired with abnormally high pressures and velocities, which reached in the 157th round a maximum of 82,600 pounds pressure in the powder chamber with a resultant velocity of 3,235 feet per second. A 10-inch experimental gun was then ordered by the army and is to be tested this summer, and this was followed, in 1898, by an order for twenty-five 5-inch and twenty-five 6-inch rapid-fire guns on the same system. The terms of the contract for these guns require that they shall develop a velocity of 2,600 feet per second with a maximum chamber pressure not to exceed 45,000 pounds per square inch. The first or "type" gun is to be fired as many rounds as will develop the same amount of scoring as would result from 300 rounds with the old brown prismatic powder.

The first one hundred rounds have recently been completed by the government officials, and an extract of the highly satisfactory firing-sheet is herewith presented:

OFFICIAL TEST OF 5-INCH SEGMENTAL TUBE WIRE GUN.

Round.	Powder Charge. Smokeless Powder. Lb.	Oz.	Muzzle Velocity.	Pressure per Square Inch of Bore.
1	10	..	....	*18,000 lb.
2	12	..		21,050 "
3	15	..	2,705	32,800 "
4	16	..	2,821	35,750 "
33	14	6	2,601	30,000 "

* Should read less than 18,000 lbs.

In the first few warming-up rounds the pressure was run up from less than 18,000 pounds toward the maximum of 45,000 pounds, but at 35,750 pounds the velocity was already 221 feet above the contract velocity, and the powder charges were gradually reduced to 14 pounds 6 ounces of the new army smokeless powder at the thirty-third round, which gave a fairly constant velocity of 2,600 feet for a pressure of about 30,000 pounds in the chamber. The last five shots will be fired at between 45,000 and 50,000 pounds pressure, under which a maximum velocity of between 3,200 and 3,300 feet per second may be expected.

WHAT OUR CONSULS ARE DOING FOR AMERICAN TRADE.

We have, on another occasion, referred to the great value of the reports of the United States Consuls, and it seems that their enterprise is leading to trouble in Germany. The American Consul at Leipsic requested the Chamber of Commerce of that city to furnish him with certain information concerning the preparation of rabbit's skin for the hat trade. The Chamber replied that, although it was desirous of promoting the trade of Germany with foreign countries, it must, as a matter of principle, decline to furnish technical reports on German manufactures that would be likely to assist foreign competitors. The Leipziger Faerber Zeitung published the following, headed "Unfair Competition! Industrial Espionage by the Consuls of the United States." The article goes on to say: "It was left to the present administration of the 'Great' republic on the other side of the great lake to degrade a government's commercial agents to industrial spies. A report of Consul-General Frank H. Mason, of Frankfort-on-the-Main (formerly at Chemnitz) begins with the following significant words: 'I have the honor to confirm the receipt of the special instructions of the department in which I was ordered to give, in a report, such detailed information regarding the production of the tar-dye-stuffs as would enable an experienced chemist to manufacture such dye-stuffs in America.' The poor Consul, after considerable spying, had to sit down and write a report, which we may be spared from reprinting. But it says therein quite correctly, 'It is useless for anyone, even an expert, to obtain from a German factory or laboratory secret information on the substances and processes which the owner of the process desires to keep secret.' Our government should send all Consuls who are caught at such vulgar espionage their passports at once."

A Hanover paper says, "The American Consul's practice of mixing in Germany's inmost concerns is becoming systematic." A papermaking trade journal states that a Consul who desired information on papermaking was even more inquisitive than the statistical department of the ministry of the interior. Anti-American papers all over Germany are making an en-