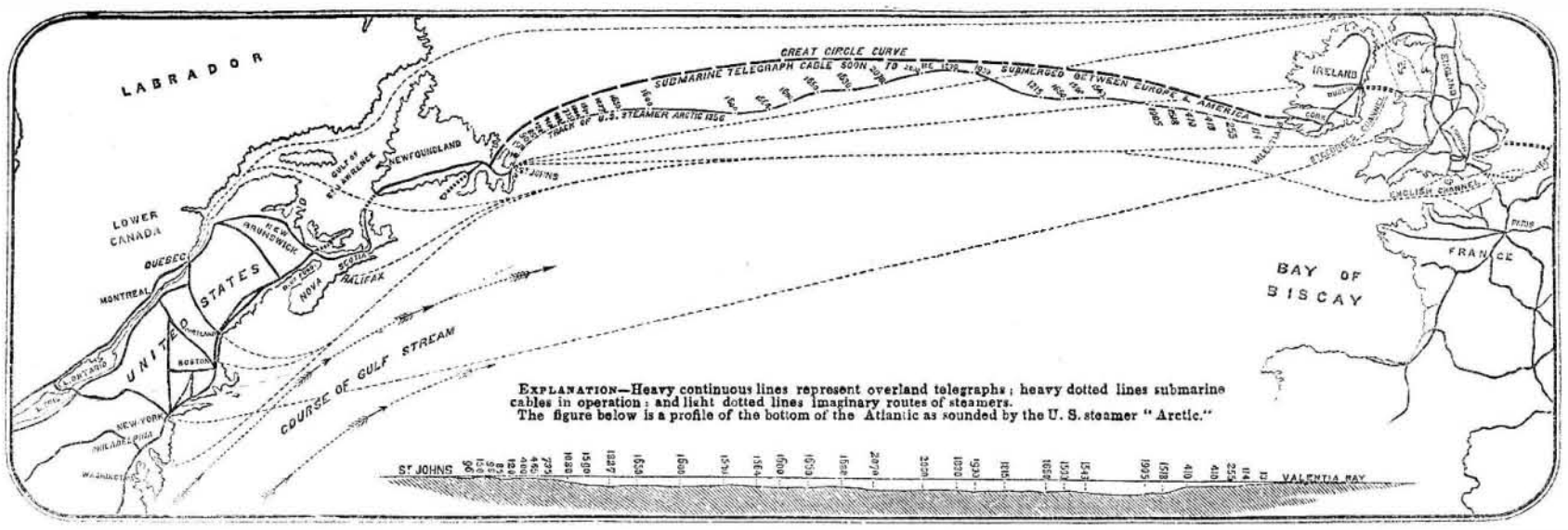
THE ATLANTIC SUBMARINE TELEGRAPH.

The great enterprise of connecting the old and new worlds by telegraph, is one of the greatest interest to all our readers. There have been but two schemes for this purpose of any prominence. One chartered by the Canadian Parliament, in 1854 or '5, proposed to telegraph in short circuits from island to island, by way of Greenland, Iceland, the Shetlands, and the Orkneys, to both the northern coast of Scotland and the western coast of Norway, the cables to be all of the heavy and most approved construction, and the circuits to be nowhere more than about 500 miles in length, so that the communication through each would be quick and certain. Little has been heard of this project since that date, but its rival, proposing to telegraph directly, by a route corresponding very nearly with that of the vessels trading between this port and Great Britain, has been urged vigorously and energetically forward. The American Telegraph Co. have conducted a line overland to the Island of Cape Breton on the east of Nova Scotia, and the New York, Newfoundland and London Telegraph Co. have laid a cable from thence under the Gulf of St. Lawrence to Newfoundland, and established a line along the south shore of that island to St. John's on the extreme eastern boundary, the very outpost of America. The harbor of St. John's has been deepened at its entrance by submarine blasting, conducted by the parties who operated successfully in removing the ledges at Hurl Gate, and has been made capable of affording facilities for the largest steamers, so that in case of failure of the main cable across the broad Atlantic, steamers can make the run and keep up the connection in less time than heretofore. But the most interest concentrates on the great effort—the transatlantic cable, the property of the Atlantic Telegraph Co.—the difficulties pertaining to, and the means adopted or suggested for overcoming which, have already occupied several of our columns.

Contracts have been made with two large manufacturers, Messrs. Kuper, of Greenwich, and Messrs. Newall, of Gateshead, Eng., for the completion, each of equal portions of the cable, on or before the end of May next. A series of observations, continued for many years past, indicate August as the period in

MAP OF THE INTENDED TRACK.



EXPLANATION—Heavy continuous lines represent overland telegraphs; heavy dotted lines submarine cables in operation; and light dotted lines imaginary routes of steamers.
The figure below is a profile of the bottom of the Atlantic as sounded by the U. S. steamer "Arctic."

which the weather is usually most propitious, and in that month of the present year two large and powerful steamships, each loaded with half the cable, are to meet at the appointed rendezvous, a certain latitude and longitude in the mid Atlantic—exchange signals and ceremonies, join the ends of their respective cargoes, fire a gun, and steam off in opposite directions each exchanging signals continually through the whole cable with its late companion, until the ends of the magic chain—a slender thread, for most of the route but made stouter when within thirty miles of each shore—are safely stretched up the beach and securely covered protect it from all malicious or mischievous intermeddling.

The distance in the nearest line is 1640 nautical or 1900 statute miles. The depth at the deepest point sounded is 2072 fathoms equal to about two and one-third statute miles. This deep point is within sixteen miles of the middle. The soundings were taken as nearly as practicable at every 20 miles, but, there are several points where a greater distance was omitted, the filling up of which is merely conjectural. The bottom is soft mud composed mainly of very minute shells, similar to such now seen above ground in the form of limestone or chalk formations; and, free from all disturbing influences, the wire will probably sink quietly into its substance several inches, possibly feet, on a good portion of the route.

The cable is necessarily slender, as a heavy one would require more vessels, and thus multiply the chances of failure in laying it. It is to be 2600 statute miles in length and weighs a little less than one tun per mile. Its whole cost is to be £224,000, equal to about $1,084,-160. It contains a single conducting thread, but this (as a safeguard against defects and accident merely) is made in several distinct wires twisted together.

THE GULF OF ST. LAWRENCE CABLE.

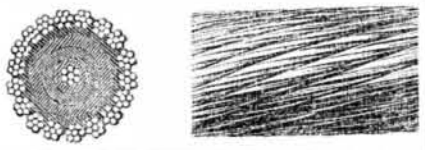
FIGURE 2. FIGURE 3.

Figures 2 and 3 represent the cable leading from the main land to Newfoundland, which is, in size and construction, the nearest analogous to the Atlantic Co.'s cable of any now in use. These cuts were intended to be of exactly the natural size, but are a little too large, the true diameter being very nearly three quarters of an inch.

Figures 4 and 5 represent the line destined to thread the depths of the telegraphic plateau, and is a little larger than the true size. The actual diameter of the cable, except at each end, as before referred to, is about five-eights of an inch, or exactly that of a five-cent piece. The central strand is composed of seven copper wires, No. 22 gauge; this is surrounded by three consecutive layers of the finest gutta percha as the insulating medium. This coating is thus laid to avoid a possibility that air bubbles or other fault may exist at any point, and endanger the insulation of its core; as by this means any imperfection in one coating is overlaid by a sound part in another. A lapping of yarn saturated with a mixture of tar and pitch is then wonnd around the gutta percha, to serve as a bedding upon which the external protecting wires are placed.

THE GREAT ATLANTIC CABLE.

FIGURE 4. FIGURE 5.



Laying the cable in the deepest water is an operation requiring considerable care. To prevent depositing it too freely in coils and serpent-like convolutions it must be kept strained and only allowed to run as absolutely required; on the other hand, any considerable over-tension would snap it. Should circumstances compel the ship to stop, the weight of some two miles of the cable must be supported, even if it be allowed to run until it hangs perpendicularly, while, if it hangs inclined, this pull may be increased indefinitely. Again, as the ship heaves with the sea, should heavy weather be encountered, each movement tends to jerk on the line, and thus aid in rending it. The most approved machinery will be adopted so as to pay it out to suit all these conditions, and every precaution is being taken to guarantee the greatest possible degree not only of insulating efficiency and strength, but also of flexibility to the cable, the strength being intended only to endure, however, until it is fairly in its place on the bottom. Submarine telegraphs have generally been covered with stout wires galvanized, but the process of galvanizing, although protecting it somewhat from oxydation, also impairs the strength of the metal, and it has been decided to cover the Atlantic cable with fine wires naked. The salt water will rust and destroy the metal, but will leave in its place a coating of oxyd so chemically combined with the mud as to form a thicker and more impervious covering. There are eighteen protecting strands on the outside of the cable, as represented, each composed of seven charcoal annealed iron wires—No. 22 gauge. There are therefore seven miles of copper conducting, and 126 miles of soft iron protecting wire in each mile of the cable, and its flexibility is represented to be such that it may be tied in a knot around a man's arm without injuring it.

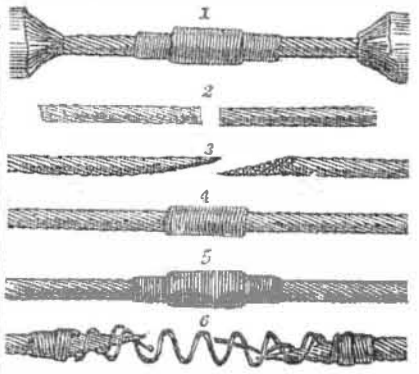
In order to lay it in the manner described, by two vessels, and provide a thicker protection near the shore, the cable must necessarily be made in four pieces, and convenience will probably induce its manufacture in a still greater number of separate sections. The following description of the mode of joining the ends we extract from the London *Engineer* of January 30:—

"The machinery employed to spin the cable consists of a large horizontal wheel, round the circumference of which are arranged a series of bobbins of the iron wire strand which is to constitute the protective armor of the cable. The gutta percha covered copper wire made by Mr. Statham, at the Gutta Percha Works, and subsequently wrapped over with the layer of tarred yarn is passed through the center of the vertical axle of the wheel to which the bobbins of wire strand are attached, and is enveloped by the wheel in revolving with a spiral covering of the outer strands.

The way in which the different lengths of the central conductor are soldered together, when required, is exemplified in the annexed wood-cuts. The two ends to be joined are first divested of the gutta percha covering, for some short distance, the extremities are then, with a file, bevelled off to the same angle, and laid together and soldered. Over the joint so made a coil of copper wire, of the same gauge, No. 22, as the strands, is wound round and soldered to it, through its whole length. Lastly, over this primary coil, there is wound yet another, which overlaps the first coil at the two extremities, where only it is soldered to the central conductor. The object of this arrangement is, that in the event of the joint giving way, the coil last put on, by retaining its hold at the two ends, and extending itself, may still be enabled, as shown in the last figure, to keep up the continuity of the central conductor.

The central conductor being formed of a strand of seven wires in place of a single wire of the same sectional area, if a flaw exist in every one of the seven wires, there is no probability of these all occurring in the whole of the seven wires at the same place; and it is evident that were these seven flaws collected in a single yard of the strand at intervals of a few inches apart from each other, the conducting power of the strand as a whole would not be reduced by more than a seventh."

It is, of course, to be understood that the joint is covered with great care with gutta percha.



If perfectly, or even if but partially successful, the existence of this telegraph will have a very important influence on the business and diplomatic relations of the new and old worlds. The difference in longitude between New York and London is such, that the news from the latter will arrive here some hours *ahead* of time, and although this difference will be against the messages going in the opposite direction, it chances that, in heavy financial operations, our market always takes its cue from the London and Paris prices, and not theirs from ours. The rate of charge for private messages has been fixed at $1 per word—none to be charged for less than twenty words. The arrangement for government service is fully expressed in the law given on another page.

The proprietors of the steamship *Columbia*, not yet finished, have purchased the right to use the Sickles' cut-off, thus seeming to concede the validity of its claim to cover the ground occupied by Allen & Wells' invention, which latter had been previously adopted

The cost of all the railroads in the United States, when those in the process of construction are completed, is estimated at $1,000,-000,000.