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## OCEAN TELEGRAPH LINES.

An international conference has lately been held in Paris, which was attended by representatives from several Governments, for the purpose of examining into the project of a new telegraphic line between Europe and America, by Arturo De Marcoartu, chief engineer of the Spanish corps, who has forwarded to us a short treatise on the subject. In this production its author discusses the merits of the several projected lines for establishing Atlantic ocean telegraphy. The new line is set forth as a universal telegraphic enterprise, not to be under the control of any particular Government, but to be cosmopolitan in its character, open to the people of all nations. It is proposed to commence the line at Cape St. Vincent in Spain and to reach America at Cape San Roque, Brazil, touching at several islands in the Atlantic, which are to form stations, and the whole oceanic line to consist of seven submarine cables of different lengths. It will start from Cadiz, run to the island of Madeira, 616 miles, next to the Canaries, by a section of cable 318 miles; thence to Cape Blanco, 533 miles; then to Cape Verde islands, 652 miles; next to Penedo de San Pedro, 1,009 miles, thence to Fernando Norona, 392 miles; and from that point to Cape San Roque, Brazil, 226 miles. The total length of line by this route will be 3,746 miles divided into seven sections of submarine cable. From Brazil it is proposed to extend the line to New York, by way of the West India islands and Cuba, with a line of six cables having a total length of 4,594 miles, thus making the entire line to New York from Europe 8,340 miles long.

It is undoubtedly much easier to work short than long submarine lines, and some of the intermediate stations on the proposed line are important positions, but compared with the line between Ireland and Newfoundland thence to New York, the expense of constructing it must be prodigious. The longest section of a cable required on this old route is 2,200 miles, while there are three sections of cable required by the new route, each of which exceeds 1,000 miles in length. If a cable can be laid and worked successfully between Ireland and Newfoundland, this will form the cheapest and most advantageous route. It is now known that the old Atlantic cable was defectively constructed, and it is asserted that, by recent improvements in the construction of cables and in apparatus for working them, no difficulty will be experienced in laying and operating the long line of 2,200 miles; therefore we hope it may soon be commenced and carried out with vigor and success. No person, however, can object to the objects endeavored to be secured by the newly-proposed line of M. De Marcoartu, namely, a universal enterprise of a cosmopolitan interest. We would like to see several ocean-telegraph lines established, if there were sufficient business to render them necessary and remunerative. Every commercial tie of this character which binds nations together exerts a beneficial influence.

There are forty-five submarine telegraph cables in operation. The first was laid between England and France, a distance of 25 miles, in 1851, and has thus been twelve years in operation. The longest, between Malta and Alexandria, is 1,535 miles long and has been in operation about one and a half years. The success of this line affords a guarantee for the

proposed line between Ireland and America, which will require a cable of only 665 miles greater length, but the distance between the two shores is not quite seventeen hundred miles.

## ARE SCRAPED SURFACES INDISPENSABLE?

In stating this question as broadly as we have done, we disclaim at the outset any intention of dispensing utterly with scraped surfaces, or of erasing from the vocabulary of mechanical technicalities this detail of the workshop. The doubt has arisen in our mind whether much of the time and elaboration expended on scraping iron surfaces might not, without injury to the work itself, be omitted. The value of a positively correct face on a valve seat or on the V-shaped ribs of a slide lathe or planer, is undoubtedly great when it is well done, but when poorly executed the utility of it is, to say the least, questionable. We make the unqualified assertion that not one man in twenty is competent to finish a truly scraped surface. Scraping iron down to a perfect face is an art by itself, and comparatively little attention, so to speak, has been given to the subject in this country. The common method in use is to take an old file of any kind (except round or square), flatten its end out like a chisel, grind it up square on the stone, and then "grub" away on the iron wherever the workman sees fit. The chances are that previous experience has not fitted the operative for this branch of his business, and he mistakes a shade on the iron for a bearing and makes a depression still deeper by misapprehending the "situation." Of course the fallacy of attempting to make a true face in this way is manifest to every one familiar with the subject. It would have been far better to have saved the time wasted in such attempts and trust to good planing and attendance in future to rectify inaccuracies.

The better way to make a scraper is to form it like a Venetian stiletto, or, more familiarly, after the model of the section of a beech nut; that is, to have the blade triangular in section, and approaching concavity. With such an instrument, properly tempered, ground, and sharpened, the finest work can be produced. A flat-faced scraper is an abomination, and only fit to dig holes or to rough out the work for the triangular scraper; it is apt to make "chatters" in the surface, and when these occur we may bid a long farewell to any fine work without filing them out—a very pretty task to undertake after something like accuracy has been attained. Most scraped surfaces are nothing but a combination of scratches, shining blotches, and untruth; and while they are a waste of time to execute, they add nothing to the mechanical value of the work. We may fairly question whether valve-seats up to 180 square inches of area, say 15 inches by 12 inches, are benefited by scraping. In some locomotive-shops in this country it is the practice to plane the valve-seat so that the tool-marks on it run in one direction, and place the valve so that similar marks in it cross the seat at right angles, and to set the valves running in this way without further adjustment. The results observed are that in a few days the valve has made a seat for itself that is far more durable than if it had been badly scraped. We do not go so far as some persons and assert that a scraped valve-seat is a positive injury, insomuch that the pores of the iron are filled with an impalpable dust that works out to the detriment of the engine in future; this theory is very finely drawn, although it may be partly sustained by facts. A finely-finished mirror-like surface on a valve-seat or lathe shears is indubitably of great value, and we must, in common justice, give credit to English workmen for great skill in this particular; in general they far excel our own workmen.

There is no reason whatever to interfere with the execution of a finely-elaborated scraped surface in our own shops; but our observation convinces us that time spent in doing such work as we have seen, might be better employed in some other way.

## RIFLE CLUBS.

If the present war has demonstrated anything it is the want of independent military organizations—independent, yet so far subordinate to the State Government that they can be mustered into service when the public weal demands it. The particular kind of

organization that we have in view in making this suggestion is a "rifle club." If we required precedent, as a nation, for taking such a step, or at least making the proposal, the example of the English, Swiss, and German nations may be cited in evidence of the popularity with which such a system is regarded abroad. Similar bodies of militia, so to speak, are also recruited in France, but they are by no means popular convocations, and are under the surveillance of the authorities. With a profound sense of the necessity which exists among ourselves for the recruiting and forming of such companies, we unite an earnest desire to see our suggestion acted upon without delay. Any person at all conversant with the history of the hour can readily perceive the inestimable value of such bodies of men and the practical use to which they could be put. Riflemen in particular are the most efficient infantry in the world when properly handled, and all generals take special care to guard against exposing their troops to their galling fire. Mechanics make the best riflemen in the world, as they do also the most versatile soldiers. The record of the war is full of instances wherein tradesmen have thrown down the musket, turned sappers and miners, completed their labors in this line, and then resumed their guns and fallen into the ranks again. They have been ready to attack the enemy either with spade or musket, and have skilfully and cheerfully performed labors, against time, that were not within the legitimate range of the particular corps to which they belonged. If these glorious achievements can be cited of those artisans now in the ranks, why can we not, in perfect confidence that our voice will be heeded, call upon other workmen still at home to organize bodies of riflemen, to form themselves into clubs of home-guards, and be willing to defend that home, either on its doorstep or 5,000 miles from it? Steady of hand, keen of vision, and stout of heart, no better materials than our mechanics can be found for the formation of a band of defenders, that shall be such in reality. In some instances military organizations have contented themselves with parades, holiday affairs, suppers, camping out in the woods of some watering-place in close proximity to a fine hotel, in short, doing everything except face the foe. We are confident that no such short-comings as these could be recorded against regiments of hard-fisted, stout-hearted workmen, and we urge them, in whatever State of the Union they may be, to take steps to form companies without delay, for at the present writing there is no prophecy when they may not be needed.

## A CAVALRY HELMET WANTED.

Any person who reads the reports of cavalry skirmishes and pitched battles, and knows the havoc created on both sides by the skillful use of the sabre, cannot but wonder that some light and efficient protection for the dragoon's head has not been proposed to the Government. We have had bullet-proof vests, which, in more than one instance, have saved the lives of the wearers. The principles involved in their construction should be carried out still further, and the head, as much the seat of vitality and energy as the heart, protected from assault, covert or open. Of course, we do not allude to any such ponderous affairs as Sir Brian Du Bois Guilbert wore in his tilts and tournaments, which weighed twenty pounds, more or less; but the sort of protective headgear we have in mind is a light steel plate set on an elastic skull-cap. Let the plate be conical in shape, hard enough to resist indentation, and then, armed and equipped with this, the enemy who should be rash enough to smite the wearer would be doubly foiled; his own arm would be lamed by the glancing and wasted force of his blow, and the helmeted trooper would also be unharmed. Such a helmet would be attacked instantly by the enemy until they found aggression useless; for the temptation to knock off a man's hat is always irresistible, especially if he has on one of a singular appearance. It would also add to the *tout ensemble* of a squadron if it was made bright and neat in appearance, and in many ways would be highly desirable. The helmet need not weigh as much as a fireman's hat and would be a most efficient protection. It would not only save the head, but in most cases would protect the shoulders from injury, as it would be difficult to deliver an undercut in a general *mélee* that would disable a

horseman. The head is the first point, however; let us have that protected and the efficiency of the cavalry will be doubled. Who will introduce a cavalry helmet?

#### GREATER ECONOMY IN COAL CONSUMPTION DEMANDED.

The exorbitant demands of the coal-dealers are causing a universal inquiry into the justice or necessity of such prices as are exacted. We have seen no evidence adduced that is worthy of a moment's attention, which could justify the enormous advance of this article of prime necessity, although it has been urged that the strikes of the miners and inadequate facilities for transportation are insuperable obstacles to a reduction of the price. If the public cannot succeed in inducing the coalition—for there evidently is one somewhere in the coal interest—to abate one jot of their exactions, they may at least cooperate with us in calling forth, and employing when brought to light, improvements in furnaces of all descriptions, whether for steam purposes, culinary use, or warming apartments. It is a notorious fact that a large part of the fuel, whether wood or coal, daily used, is not economized as it should be, either in burning it or in using it after it has passed through the fire. Although American stoves and furnaces rank deservedly high for apparatuses of their class, yet we think the most sanguine inventor who has ever investigated the subject will admit that there is room for improvement, and that too many of the stoves and ranges now in use devour fuel as greedily as if their proprietors held the fee simple of a coal mine. The actual value of a stove, furnace, or steam boiler depends upon the arrangement and amount of surface exposed to the action of heat, and so contrived that the greatest possible amount of caloric will be extracted from the ignited gases before they pass up the chimney. The heat, at a reasonable distance from the stove, which passes off into the air through the pipe unused, is a proof that more fuel is burned than the stove can work to advantage, and also that money is expended for which there is no return. The same is the case with steam boilers; although we do not anticipate that the currents passing through the chimney—that gases liberated by combustion will be so cooled that the smoke-pipe will answer the purpose of a refrigerator—yet we do expect that vital improvements will be made so that the heat which issues from the smoke-pipe will not be so great as to burn out the top of the same in a short time, sixty feet or more from the furnace.

We remarked at the commencement of this article that fuel, more particularly coal, was not generally used after it had once passed through the fire. Such is the fact. All of the coals are not subjected to the same heat alike, and some are reduced to cinders and ashes while others are only roasted or calcined and turned into coke. This refuse, so-called, properly screened and picked out, makes an excellent summer fuel, easily ignited, and gives heat enough for ordinary purposes, and it is inconceivable why so many persons throw away their ashes, and with it certainly a tenth of their coal account. Such waste is reprehensible and ought to be checked, and we hope ere long to chronicle a great addition to the list of improved coal burning apparatuses.

#### THE ENGLISH STEAM FIRE-ENGINE TRIAL.

In a conversation we had recently with a celebrated builder of steam fire-engines in this city, he expressed the opinion that, in the forthcoming trial to be had in London, our engines would prove victorious in point of distance to which water could be thrown. The English are very partial to the quantity of water projected in a given time, as a favorable quality of a steam engine, and all their machines have a much less proportion of steam area in the pistons than have ours when the relative size of the pumps is taken into account. The *Manhattan* steamer, of this city, is considered a favorable exponent of the American steam fire-engine, but it is said that the English engineering community do not look upon the rotary pump with much favor. We think this rather anomalous, considering the merits accorded to the Gwynne centrifugal pump, and the changes rung upon it by all English journals, from those competent to criticize its qualities down to others who do not know the difference between a rotary pump and

a penny whistle. We have expected to see some English fire-engine fitted with this pump, and a trial had of its virtues or advantages over the Carey pump, such as is the *Manhattan's*; there may be some engine of this kind entered for exhibition, but we have been given to understand that the English machines are all fitted with reciprocating pumps. A large proportion of our mechanics are away at the war, fighting for their country, but those who remain will look eagerly for the result of the trial, as they expect to see the confidence they have placed in their machines fully sustained.

#### THE DISCOVERERS OF THE SOURCE OF THE NILE.

Captains Speke and Grant, whose discovery of the true source of the Nile was formerly noticed in our columns, have arrived in London, and were publicly received by the Royal Geographical Society on the evening of the 23d ult. Sir Roderick Murchison introduced the two travelers, who addressed the meeting and gave an interesting account of their discoveries and adventures. They were attended by two boys, aged about 15 years, natives of the country, who were brought to England with the consent of their parents to receive a good education and then be sent back to their native clime. Their skin is black and their heads covered with the usual coat of wool, but their features are regular, their noses being straight and foreheads as high as those of Europeans. The races in the region of Lake Nyanza (Captain Speke believes) are descended from the Abyssinians and Hindoos. The men are tall and well made, and they are honest and friendly.

When Captain Speke visited the king of Uganda, his sable majesty said he must sit on the ground and wait until he was given an audience. The captain answered that he was a prince and was not accustomed to wait; and he terrified the king and his whole court into submission by opening his umbrella, which they took to be a deadly weapon employed for killing by magic.

Lake Nyanza, the source of the Nile, is situated at an elevation of 3,500 feet above the level of the sea, in latitude three degrees south, and from where the Nile leaves this lake until it reaches the Mediterranean Sea it traverses a distance of 3,000 geographical miles. The lake is in the region of the Mountains of the Moon, in the middle of the rainy zone where, in 1862, Captain Speke noticed that rain fell, more or less, during 233 days of the year. This accounts for the perpetual supply of waters to the Nile. At the center of the northern coast of the lake the parent stream of the Nile issues over a precipice twelve feet in height. The travelers proceeded down this branch from Lake Nyanza, and after many delays and incidents reached Rhartown last spring; the time of their travel having occupied two years and a half, and the distance explored being 3,000 miles.

#### OUR "BRANCH OFFICE" AND THE WAR.

At the beginning of the invasion of Pennsylvania the necessity of "uncovering" Washington became a fixed fact; but to leave it unprotected, while the army of Gen. Meade went forth to drive back the forces of Gen. Lee, might result in its possible capture by Gen. Beauregard's forces, which were understood to be "on the move" from Richmond to aid the rebel army of invasion. To provide against this exigency the President called into the service for sixty days—unless sooner discharged—every able-bodied man between 18 and 45, within the limits of the District of Columbia. The entire force employed in the Washington "Branch Office" of the *SCIENTIFIC AMERICAN* was called out, and we are happy to know, went cheerfully to meet the summons. At one time it seemed to us that we should be compelled—for a short time, at least—to close our efficient "Branch Office." We are much pleased to learn, however, that the President considers that the exigency no longer exists, and all our Washington employes are now following their accustomed duties in our service.

The ram *Atlanta* has been pronounced unseaworthy by an examining board from our navy at Port Royal. She has six inches of water in her hold, and a steady leak is observable in the place where the iron-work is fastened to the hull. Her guns are all marked "Tredegar Iron-works, Richmond," and one of them is of this year's casting.

#### KRUPP'S PRUSSIAN STEEL-WORKS.

At the recent great International Exhibition in London, the products of the immense steel-works of Frederick Krupp, at Essen, Prussia, attracted great attention from scientific and practical men of all countries, by reason of the character and class of articles made at that establishment. Steel crank-shafts forged solid, double throw, are produced weighing 12 tons and over; cast-steel guns of the largest bores and the finest possible texture are turned out according to contract in large numbers. The Russian Government are now having 100 steel breech-loading guns made, of 11½ inches bore, and weighing approximately 16,666 pounds, at an aggregate cost of 500,000 thalers. (A thaler is 70 cents.) Our own Government has also ordered a 7½ inch steel gun, Dahlgren pattern, to experiment with. Every kind of steel forging that can be named is made by Krupp; and his steel tires for locomotives are especially commended by all who have used them. The tires for locomotives are made without a weld, and are calculated to run from 80,000 to 100,000 miles without turning; and when turned up they lose but ½ of an inch of metal. The "life" of a 2-inch tire is usually computed at about 250,000 miles on an average. Cast-steel ingots are produced weighing 40 tons, which are forged under a steam hammer of 50 tons' weight, having a fall of 10 feet. The cannons have undergone trials at Woolwich (England) which have proved that they cannot be bursted, so exceedingly tough and well wrought is the nature of the metal. Nearly all the Governments in the world have ordered some cannons from Krupp's works. A bolt, 8 feet 9.5 inches long and weighing 1,000 pounds, was fired from one of Krupp's patent breech-loaders, without injury to the gun or breech-loading apparatus.

The works are located near the Rhine, about 50 miles below Cologne, on the opposite bank of the river; they cover nearly 200 acres, about one-tenth of which are under roofs. The consumption of coal is about 250 tons per day; the coal is obtained in the immediate neighborhood.

Mr. Krupp's New York agent, Mr. Thomas Prosser, of 28 Platt street, this city—has large lithographs representing Krupp's works and other matters connected with that establishment, all of which are very interesting.

**TESTING ORDNANCE.**—For several weeks past, a thirteen-inch gun, of Rodman's model, cast at Fortress Monroe, has undergone a series of experiments. Its weight is 33,615 pounds, and it is fourteen feet long. A two-hundred-and-seventy-five-pound shot has been fired, with a charge of thirty pounds of powder, and, as yet, there is no perceptible enlargement of the bore, though the piece has been discharged nearly three hundred times. Thus far the experiments have been confined to trying the gun's durability; but, in a few days, the test will be made as to the distance and penetrability of the projectiles thrown.—*Pittsburgh Dispatch.*

The ship *Resolution*, in which Captain Cook left England on his second voyage round the world in 1772—ninety years since—is now at Demerara waiting a cargo of sugar.

The amount of money found in letters at the Dead Letter Office, during the last year, was over \$80,000, being an excess of \$30,000 over the previous twelve months.

Divers have already succeeded in securing \$40,000 worth of goods, and raised one box containing \$32,000 in specie, from the wreck of the *Anglo-Saxon*, off the coast of Nova Scotia.

It is estimated that the aggregate yield of the California gold mines, since the discovery of gold in 1846, is twelve hundred and fifty millions of dollars.

ASSISTANT SECRETARY OF THE NAVY, FOX, states that the whole number of vessels captured or destroyed by the blockading fleet up to June 1, is 855.

UPWARDS of £300,000 have been subscribed in England to the Atlantic telegraph, and it is said that the work is to be prosecuted immediately.

It is said that a bank-note printed in blue on a yellow ground is the only one which cannot be reproduced by photography.