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# The Nation

A WEEKLY JOURNAL

DEVOTED TO

POLITICS, LITERATURE, SCIENCE & ART

VOLUME LVII

FROM JULY 1, 1893, TO DECEMBER 31, 1893

NEW YORK

THE EVENING POST PUBLISHING COMPANY

1893

P 00538

United States Geological Survey, Member of the National Academy of Sciences, etc. In four volumes. New York: Francis P. Harper. 1893.

This title-page, printed in twenty-eight lines, is notable. It is six lines longer than that of the *editio princeps*, and stands in sharp contrast to the Dedication, in which, in six lines, Dr. Coues pays a fitting tribute to the people of the great West, as well as to the statesman who first foresaw, and the soldiers who first saw, their future domain. Lewis and Clark were the first men to cross the continent in our zone, the truly golden zone. A dozen years before them, Mackenzie had crossed in British dominions far north, but settlements are even now sparse in that parallel. Still earlier had Mexicans traversed the narrowing continent from the Gulf to the Pacific, but seemed to find little worth discovery. It was otherwise in the zone penetrated by Lewis and Clark. There development began at once and is now nowhere surpassed. Along their route ten States, with a census in 1890 of eight and a half millions, have arisen in the wilderness. These millions and more yet unborn must betake themselves to Lewis and Clark as the discoverers of their dwelling-places, as authors of their geographical names, as describers of their aborigines, as well as of native plants, animals, and peculiarities. In all these States the writings of Lewis and Clark must be monumental—the *crux* is that Thucydides wished for. In disputes about the ownership of Oregon, when it was urged that the United States could claim only the mouth of the Columbia because Capt. Gray had discovered nothing more, while a British vessel had been first to sail a hundred miles up the river, it was answered that the two American captains had explored it ten times as far. But they did very much more. They were the first that ever burst through the Rocky Mountain barrier, and they made known practicable passes. They first opened the gates of the Pacific slope, and hence filled the valley of the Columbia with Americans. We thus obtained possession, which is proverbially nine points, and that while diplomacy was still vacillating.

The credit of our Great Western discovery is due to Jefferson, though he never crossed the Alleghenies. When Columbus saw the Orinoco rushing into the ocean with irrepressible power and volume, he knew that he had anchored at the mouth of a continental river. So Jefferson, ascertaining that the Missouri, though called a branch, at once changed the color and character of the Mississippi, felt sure that whoever followed it would reach the innermost recesses of our America. Learning afterward that Capt. Gray had pushed into the mouth of the Columbia only after nine days' breasting its outward current, he deemed that river a worthy counterpart of the Missouri, and was convinced that their headwaters could not be far apart in longitude. Inaugurated in 1801, before his first Presidential term was half over he had obtained, as a sort of secret-service fund, the small sum which sufficed to fit out the expedition. He had also selected Lewis, his private secretary, for its head, and put him in a course of special training. But the actual voyage up the Missouri, purchased April 30, 1803, was not begun till the middle of May, 1804.

Forty-five persons in three boats composed the party. They were good watermen, but navigation was arduous, the river extremely rapid, changeful in channel, and full of eddies and sawyers. The last white settlement was passed within a week, but some meat and corn

could be bought of Indians, though delays were necessary for parleys and even councils with them. Others were occasioned by hunting parties who were kept out in quest of game. After 171 days the year's advance ended with October, for the river was ready to freeze. The distance up stream they reckoned at 1,600 miles, or little more than 9 miles a day, a journey now made by railroad in forty-four hours. But it is not likely that any other men could then have laid more miles behind them. In addition to detentions already enumerated, rudders, masts, oars were often broken, and replacing them cost time; boats were swamped or overset, or could be forced onward only with tow-lines.

Winter quarters were thirty miles above the Bismarck of our day. Here they were frozen in about five months. The huts they built and abundant fuel kept them warm. Thanks to their hunters and Indian traffic, food was seldom scarce. Officials of the Hudson's Bay Company (who had a post within a week's journey) and many inquisitive natives paid them visits. From all these it was their tireless endeavor to learn everything possible concerning the great unknown of the river beyond. Scarcely one could tell about distant places from personal observation, but some second-hand reports were afterward proved strangely accurate, even as to the Great Falls, which turned out to be a thousand miles away. It was not long, however, before they learned that the wife of Chaboneau, whom they had taken as a local interpreter, was a captive whose birth had been in the Rocky Mountains. She, named the Bird-woman, was the only person discoverable after a winter's search who could by possibility serve them as interpreter and guide among the unknown tongues and labyrinthine fastnesses which they must encounter.

Early in April, 1805, the explorers, now numbering thirty-two, again began to urge their boats up the river, for their last year's labors had brought them no more than half-way to their first objective, its source. No more Indian purveyors or pilots: their own rifles were the sole reliance for food. Many a wigwam, but no Indian, was espied for four months and four days after they left their winter camp. It was through the great Lone Land that they groped their dark and perilous way. In twenty days after the spring start they arrived at the Yellowstone, and in thirty more they first sighted the Rocky Mountains. Making the portage at the Great Falls cost them a month of vexatious delay. Rowing on another month brought them on August 12 to a point where one of the men stood with one foot each side of the rivulet, a . . . "thanked God that he had lived to bestride the Missouri, heretofore deemed endless." They dragged their canoes, however, up the rivulet for five days longer. It was 460 days since they had left the mouth of the river, and their mileage on its waters had been 3,096 miles. A mile further they stood on the great divide, and drank of springs which sent their water to the Pacific. But meantime they had been ready to starve in the mountains. Their hunters were of the best, but they found no game: buffaloes had gone down into the lowlands, the birds of heaven had fled, and edible roots were mostly unknown to them. For more than four months they had looked, and lo! there was no man. It was not till August 13 that, surprising a squaw so encumbered with papposes that she could not escape, and winning her heart by the gift of a looking-glass and painting her cheeks, they formed friendship with her nation, one of whose chiefs proved to be a brother of their

Bird-woman. Horses were about all they could obtain of these natives, streams were too full of rapids to be navigable, or no timber fit for canoes was within reach. So the party, subsisting on horse-flesh, and afterwards on dog-meat, toiled on along one of the worst possible routes. Nor was it till the 7th of October that they were able to embark in logs they had burned hollow, upon a branch of the Columbia, which, after manifold portages and perils, bore them to its mouth and the goal of their pilgrimage, late in November. Its distance from the starting-point, according to their estimate, was 4,134 miles.

A winter of disappointment followed, for no whaler or fur-trader appeared to supply the wayfarers with food or clothing or trinkets for the purchase of necessities on the homeward journey. Game was so scarce that it is possible they would have starved had not a whale been stranded near them—sent, they said, not as to Jonah, to swallow him, but for them to swallow. In the spring of 1806, when they turned their despairing faces away from the Pacific, all the beads and gewgaws for presents to savages and procuring supplies during their home stretch to the Mississippi might have been tied up in two handkerchiefs, if they had had any such articles. Their last tobacco had been consecrated to the celebration of Christmas, and the last whiskey had been drunk on the previous 4th of July. All roads homeward are down hill. A forced march of six months brought the discoverers from the ocean to St. Louis, September 23, 1806, though they were obliged to halt a month for mountain snows to melt. From first to last not a man had perished through accident, wild men, or wild beasts, and only one through sickness.

Many an episode in this eventful transcontinental march and countermarch will hereafter glorify with romantic associations islands, rivers, rocks, cañons, and mountains all along its track. Among these none can be more touching than the story of the Bird-woman, her divination of routes, her courage when men quailed, her reunion with a long-lost brother, her spreading as good a table with bones as others could with meat, her morsel of bread for an invalid benefactor, her presence with her infant attesting to savages that the expedition could not be hostile. But when bounties in land and money were granted to others, she was unthought of. Statues of her, however, must yet be reared by grateful dwellers in lands she laid open for their happy homes. Western poets will liken her to Ariadne and Beatrice.

*Personal Recollections of Werner von Siemens.* Translated by W. C. Coupland. D. Appleton & Co. 1893.

SUCH a number of the Siemens brothers have distinguished themselves in the engineering world, and especially in electricity, that really a guide-book to their respective performances was becoming a public desideratum. This book in some measure fills that want. Siemens Brothers, Siemens & Halske, and other firms of Siemenses, which practically make one concern, are renowned all over the world for executing in the most scientific way possible everything connected with telegraphy, such as operating land lines, laying cables, inventing and manufacturing all sorts of electrical instruments, preparing gutta-percha, making the glass required in the business, mining the copper, and also as inventors and manufacturers of regenerative furnaces and the regenerative Siemens gas-burner. The brother whose name

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is the most familiar to readers of English books was Sir William Siemens, who worked a great improvement in the quality of English enginery, and first forced the practical Englishman to entertain a sincere respect in practical matters for the scientific physicist. He died ten years ago, receiving the last distinction of a burial in Westminster Abbey. He was the fourth of the brothers. Hans, the second, made the glass. Friedrich, the fifth, inventor of the Siemens burner, devotes himself to regenerative combustion. Charles, the sixth, is probably the greatest business manager among them. Walter, the seventh, was the developer of the wonderfully scientific copper-mine in the Caucasus; while Otto, the eighth, was his successor there. Several others of the name have been connected with the business; but the most interesting man of them all has been the eldest of the brothers, Dr. Werner von Siemens, Member of the Berlin Academy of Sciences, inventor of the dynamo, discoverer of electrostatic charging by means of a battery, author of the Siemens unit of resistance, earliest adherent of Faraday's theory, and founder of the fortunes of the house of Siemens.

The mechanical perfection of the volume is worthy of the author. A sea-green linen binding, leaves of tinted paper so thick that 175 of them make an inch, tastefully cut pica, superb presswork, all proclaim that commercial remuneration has not been the first care. In fact, the work is in part quite frankly of the nature of a *réclame*. Dr. von Siemens had perhaps some share in a moral quality not unknown among his countrymen, a deep compunctious sense that his besetting sin was excessive modesty and self-depreciation, with an earnest resolve to fight it down, if so be by God's grace he might. But there are in truth several reasons why Werner Siemens did not for long receive all the credit to which he was justly entitled. In the first place, he was not a thoroughly educated physicist, and often made slips that show it. We will not recount the deplorable history of the bathymeter; but will rather select a less decided example. He says in this book (p. 327) that the problem of a flying-machine "is, for every mind possessing a slight mechanical training, a very simple one." He proceeds to say that inclined planes to assist in supporting the weight are worthless. Now, such argumentation was pardonable in Babinet forty years ago, but it has since that time been plainly shown that it rests on assumptions in regard to the motions of fluids which resemble but very slenderly the facts of nature. To-day, to accuse those who are engaged upon the problem of the flying-machine of ignorance is simply to expose one's own. Now, it is very natural that scientific men, with the enormous volume of new work that they have to examine, should be somewhat slow in finding out the real merit of those who so make themselves ridiculous. In the second place, Dr. Siemens stood, for the greater part of his life, outside the circle of German university professors, and advocated a theory to which they were disinclined. In some branches, such as that of philosophy, to be opposed to the official view in Germany means utter neglect. In physics, it is not so bad; still, even in physics nobody who understands the German can think that it could be unimportant. In the third place, Siemens's profession was one in which enormous profits were to be made—profits depending upon the man's reputation. No wonder, then, that, in that line, competition for the honor of discoveries should be particularly bitter and ungenerous. Add that Siemens himself had shown himself as adroit as any-

body in combining scientific research with the pursuit of wealth, and it was hardly to be expected that the friends of his competitors should do him any public honor which, by any means not positively dishonorable, they could wrest from him.

After all, his scientific merit, which is certainly considerable, though hardly to be called great, is everywhere recognized. His highest capacity is not in pure science but in engineering, or, rather, it is of a military kind. He makes a marvellously clear and penetrating judgment quickly, and is ready to stake his fortunes upon it. The first successful deep-sea cable was laid in 1857 from Bona in Algeria to the island of Sardinia. The house of Siemens had furnished only the electrical apparatus; but Werner Siemens was to do the testing of the cable during and after the laying. He had no further responsibility. The cable was an old-fashioned affair weighing at least four pounds per yard. The problem of how to lay such a thing down, without breakage and without waste, at a depth of 1,000 to 1,500 fathoms, was so difficult that the different engineers who were to be upon the vessel found themselves, on the passage from Genoa to Sardinia, of the most widely different opinions about the matter. The man who was responsible, an Englishman, thought the best way was to proceed quickly, and let the cable run out without check, so as to bring no strain upon it. A French engineer, on the other hand, thought that the cable would hang down in a catenary curve, and would necessarily break. This was certainly far from a foolish idea. Siemens did not expect to have anything to do with the mechanical business, but declared that the operation could not be performed as the Englishman proposed, yet that it could be done by putting on a break sufficient to support a weight of cable equal in length to the depth of the water. They started from Bona in the evening, proceeding on the English plan. By dawn they found they had laid a third part of the cable, though they had covered only a fifth of the distance. They had only just enough left to reach a shallow spot near Sardinia. The contractor then went to Siemens and requested him to lay the remainder of the cable. Many a man would have simply washed his hands of it. Why should he undertake so difficult a task and such enormous responsibility, without preparation, without any surplus of cable, and without adequate machinery? Incredible as it may seem, they did not even have a ship's log-line on board. Here was this untold problem of laying down perhaps a million dollars' worth of cable at the bottom of the deep sea, without losing it if one could help it. Yet Siemens does not seem to have hesitated. He laid the cable; and, although he strained it a little, he laid it successfully. We can well believe him when he says:

"The continuous mental strain, and the consciousness that any error committed may occasion the loss of the whole cable, makes the laying of a deep-sea cable a very anxious, and for a length of time thoroughly exhausting, affair for all concerned, and especially for the leader of the undertaking. Towards the end of the foregoing work, in which I would not allow myself a moment's rest and refreshment, I could only keep myself up by frequently taking strong black coffee, and required several days for recovering my strength."

The full account of Siemens's work will be most interesting to the engineer and to the man of science; but even the reader who may choose to skip all this will find it one of the most charming publications of the year. He

will be surprised to find how many exciting adventures Siemens met with. At the very outset of his career he found himself defending a fort at Kiel against the Danes. For this purpose he was obliged to recruit a force, and, having enlisted them, to persuade them to go out of their own territory. It is needless to say that the defence was conducted on scientific principles. Submarine mines, or torpedoes, were used. They so scared the Danes that there was no attack. Another time he was shipwrecked in the Red Sea, and, with a whole steamer full of people, was cast upon a bare rock, where they nearly perished from thirst. Once, when he was laying a cable, a waterspout passed over the vessel. As for such incidents as accidental explosions, imprisonment, duels, being under fire in war, getting nearly frozen to death, complete destitution, peril from sharks and from robbers, danger of being put to death as a wizard, his life seems to have been full of them. There are many spirited descriptions of scenes and of phenomena of sky and sea. The anecdotes about curious personalities and amusing situations are many and good. Unfortunately the English of the translation, seldom excellent, is in many a place painfully awkward, quite ungrammatical, or downright unintelligible. The translator seems to be one of those persons who think they can improve upon accepted English idioms, and reform the language on a German model. There is, no doubt, some analogy between a rude, obscure style and disobliging, surly manners. It is singular how many admirers both find in Prussia. Siemens himself, though his style, when he is off his guard, is often delightful, yet explains, evidently with an approving conscience, that he has taken no pains whatever to write agreeably; and one of his main regrets at leaving the Prussian army was that he found the bluntness of the Prussian military manners so charming. He then considered whether or not he should become a Prussian Amtmann; but the manners of that class were not sufficiently rasping for his taste. Such tastes are certainly not to be disputed, but we should like to have them expounded. The idea seems to be that whatever is unamiable is sterling and virtuous.

*People's Banks: A Record of Social and Economic Success.* By Henry W. Wolff. Longmans, Green & Co. 1893.

THE cry for governmental aid for all the poor and oppressed is now so shrill and incessant that the public has no ears for reports of what the humbler members of society have done for themselves. These reports will be neglected until philanthropists understand that the problem of poverty is a moral one, and that all schemes for regenerating men by improving their material conditions are idle unless their character also is improved. Meanwhile, those who hold that men must work out their own salvation are cheered from time to time by evidence that this is done to a greater extent than is commonly supposed. Not long since we noticed Mr. Wilkinson's little book entitled 'Mutual Thrift,' as revealing the unsuspected magnitude of the business of the provident societies in England. We have now before us a very striking account of what has been done in the same general direction, although with different methods, in some of the Continental countries, especially Germany and Italy. It is much to be regretted, however, that the description of this work did not fall into more competent hands. Mr. Wolff is enthusiastic in a good cause; but his knowledge

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