

## A WORD FOR THE MOTHER.

Send the children to bed with a kiss and a smile;  
Sweet childhood will tarry at best for a while;  
And soon they will pass from the portals of home,  
The wilderness ways of their life-work to roam.

Yes, tuck them in bed with a gentle "good-night!"

The mantle of shadows is veiling the light  
And may be—God knows—on this sweet little face,

May fall deeper shadows in life's weary race.

Yes, say it: "God bless my dear children, I pray!"

It may be the last you will say it for aye!

The night may be long ere you see them again;

And motherless children may call you in vain.

Drop sweet benediction on each little head,  
And fold them in prayer as they nestle in bed;

A guard of bright angels around them invite,

The spirit may slip from the mooring to-night.

## THE GREAT TUNNELS.

UNDERGROUND WORKS, BOTH ANCIENT AND MODERN.

THE TUNNELS OF ALBANO—OF CLAUDIUS—OF THE THAMES—OF MOUNT CENIS—OF THE HOOSAC—OF THE STRAIT OF CALAIS—OF THE HUDSON.

Modern civilization means for the most part fast going. Indeed all human progress from the first may be said to mean the same thing, rapidity of locomotion; and the peoples most enlightened and most talked of in history—Tartars, Assyrians, Huns, Greeks, Carthaginians, Romans—were very fast goers by sea and land. The Romans were the quickest marchers of the ancient world. These antique celerities told most in war. Ours, more happily, run, and promise to run, in the ways of peace—though the Bismarcks can see how they may help the paroxysmal work of a sudden campaign now and then. To meet the needs of a better order of progress, men have invented railroads; and the tunnels are the natural corollaries of these. Those subterranean passages are making themselves very important adjuncts of civilization, and the most astonishing feats of modern engineering are performed by the tunnel-makers. Just now the two great powers of Western Europe are bent on perpetuating their *entente cordiale* by a vast submarine railway between Dover and Calais.

## THE FASHION OF TUNNELING

has a modern look, but it is a very old one. It is, in fact, one of the oldest. The earliest human tribes lived in tunnels, that is, in caves and hollows in the earth, and were all troglodytes. It was the Fall which had reduced those tribes to that savage condition of life. The earliest secular records indicate that condition, and history shows how it was perpetuated, and how men in comparatively modern ages practiced that old style of domestic architecture. The Greeks, when they had got a good many of the comforts of life about them told terrible stories of those troglodytes, living, they said, in Upper Egypt, Ethiopia, and other outskirts of the world, and making their dwellings in dens, hollows and gorges, things that were then called *dargles*, and are so called still among the Kelts and elsewhere. In the warmer latitudes of Asia, which were evidently the first haunts of the race, men would prefer shade to sunshine, and would look for the high rocky grounds in which they could make their burrows. Almost everywhere in Western Asia and Northern Africa the elevated ridges had their swarms of tenants from age to age. The rocks that bound Egypt on both sides had their population long before the Pharaohs raised pyramids and palaces on the more level ground. The ancient Etruscans were known for their skill in tunneling craggy places, and the Romans, who learned from them, followed the same laws of comfort and safety, and elaborated their domestic earth-works. It is the same everywhere—eastward to Elephant and Elora, and westward to Denmark and the British Isles. And there was another grand reason why those earth-grubbing customs were perpe-

tuated among men. A reason of religion. It is now recognized that the first temples of men were "cave-temples," that is, holes in the ground, dug into a long narrow entrance and terminating in a round or elliptical cave. Such was the bottle-shaped cavern of Cuma, of Eleusis, of Mithras, of Avebury, of Upsala, and 10,000 others, in all parts of the world. Men were tunnelers everywhere, and when they did not want caves to live in they kept them as temples, and subsequently as burial places. They were also used as strongholds in war, and in all old languages the terms for "cavern" were terms for house, temple and *arx*.

Another evidence of the old tunnel-craft of mankind is found in

## "THE CATACOMBS."

those things that lie at the bases of so many great capitals and preserve such strange memories of an elder state of society. The site of Egyptian Thebes was once honey-combed with tunnels and caverns leading from one great edifice to another, and as far as the great ridge of Lybicus on the west, where for ages men had their homes of the rock. In later ages, when the Christian Cops went to live in those caves, their choice was a natural and familiar one, and they meant to live quietly and comfortably, and not in anything like privation or penance. The catacombs of Rome were residences of the poorer order of citizens, and subsequently burial places. Horace tells us how the Potter's Field of Rome was under the Esquiline Hill. It is said that the passages of the place would make a length of 600 miles, and that they hold the remains of 6,000,000 of the dead. In time, when the Subalpines have polished the upper aspect of Rome, travelers will go to look for her genuine antiquities under ground. Syracuse, Naples, Paris, and other cities have their catacombs; and all these are evidences that the early architectural notions of men were something like those of the *teredo* and the mole, and that where they first scooped out their dwelling places they afterwards built up their temples, palaces and ramparts.

The Etruscan people were known from the earliest ages as first rate craftsmen in the business of tunnel-making; and in this as in many other matters, they were the learned instructors of the Romans. A remnant of their work is still visible at the Lake of Castello, (Albano,) built 300 years before our era, about sixteen miles from Rome. The lake is six miles in circumference, lying 1,000 feet deep, in the cup of an extinct volcano; and the story is told that when the Romans besieged Veii, the Tuscan augur, or army chaplain, declared it could never be taken till the water could be reduced in its bed. A tunnel was accordingly made, and it still carries off the water of the lake through the hill for a mile and a half, its arched opening being seven feet high and four feet wide. In a later age, the Emperor Claudius, who loved the Etruscans and their traditions, and kept a pet college of old augurs to teach engineering as well as priestcraft, built a tunnel three miles long between the Lake Fucinus (Celano) and the River Garigliano. This passage, thirty feet high and twenty-eight feet wide at the entrance, was lately repaired by the Neapolitan Government, and is still in excellent order.

## IN THE MIDDLE AGES

the art of tunneling was disused, and it only revives in our own time with the spread of the railway system. There are at present about eighty miles of tunnel in England, the longest passage, of 5,500 yards, being at Huddersfield. The longest in France, on the St. Quentin Canal, has a length of over 13,000 yards. But the English distanced all competition in that line when they built the Thames Tunnel. The idea of this originated in 1798, when Mr. Ralph Dodd proposed to make a way under the river between Gravesend and Essex. In 1804 Mr. Trevethick made a trial on the present site of the tunnel. He made a passage five feet high and three feet wide, and this he had carried nearly across to Wapping, when the river broke in and spoiled the experiment, throwing such a quantity of cold water on the project that the English became disgusted and would have no more of it. They felt uncomfortable just then, knowing that the united fleets of France and Spain were ready to try conclusions with Lord

Nelson in the chops of the channel. But in 1826 the passage between Rotherhithe and Wapping (about a quarter of a mile across) was again attempted, under the guidance of Mr. Brunel. In 1827 the water burst in, in spite of the caution with which the shield was advanced, and the labor was suspended for a time. In 1828 a like accident occurred, and six men were drowned. After this the work ceased for seven years. It was renewed in 1835, and continued till the passage was completed. It lies sixteen feet below the bed of the river, and is 1,200 feet long between the shafts on either bank—that is, something about a quarter of a mile. It has two arched ways, each sixteen and a half feet high by fourteen feet wide, with a wall between them. It cost about £500,000, and was never remunerative, being only used by pedestrians, who paid the toll of a penny, and furnished just enough to keep it in repair. In 1865 it was sold to the London Railway Company for £200,000, and is used as a connection between their roads running on the northern and southern sides of the Thames. The tunnel was in fact a failure, and in time to come a better one will no doubt be built near that locality—one that will allow the passage of heavy trains or wagons. In 1869 another tunnel was carried under the Thames at Tower Hill, and completed in a year at the cost of £20,000. This allows the travel of omnibuses. Another (a land tunnel) has been made in Arthur street, and another from Poplar to Greenwich. Along with these London has dug three and a half miles of tunnelling for its great subterranean railway, and will probably dig a great many more. So that, if it cannot boast of its catacombs, like so many other great cities, it seems bent on making up the subterranean deficiency in another and more utilitarian way.

## MONT CENIS.

Fourteen years after the opening of the Thames Tunnel, the governments of France and Sardinia encouraged the far grander enterprise of a passage through the Alps, under the height of Grand Vallon, near Mont Cenis. The idea of this was afloat in 1841, when Joseph Medail, of Bardonnèche (the Italian end of the tunnel), proposed to pierce Mount Frejus. In 1857 it was decided that the way should run under the Grand Vallon from Modane, on the upper side, to Bardonnèche, on the Italian—a subterranean distance of seven miles and a half. Count Cavour warmly patronized the undertaking, and the cutting of the first sod at Mondane, in the above year, was witnessed by King Victor Emanuel and Prince Napoleon. As the height of the Grand Vallon did not permit any intermediate shaft sinking, the labor was begun and carried on from the two ends toward the centre. The work of boring was done in the old way, by hand, till 1861, when the engineers—Sommeiller, Grandis, and Grattoni—devised a piece of machinery, set in motion by compressed air, acting with a force of five atmospheres, through a piston in a cylinder. With this half a dozen borers were driven simultaneously against the rock, and the advance was ten times as fast as before. In 1866 half of the distance had been excavated, and in 1870 the workmen meeting at last, shook hands through an opening in the tunnel. In 1871 the way was open for travel, after the labor of fourteen years. This great achievement encouraged men to hope for the removal of other alpine difficulties, and at the present time another railway tunnel is making its way under the heavy mass of Mont St. Gothard.

In our own country the necessities of travel and trade have originated a great many tunnels, the most remarkable of which is the unfinished passage through mica slate and quartz rock under the Hoosac Mountain, 18 feet high by 14 feet wide, and destined to be 24,000 feet, or four and a half miles long. But

## THE GREATEST TUNNEL IDEA OF MODERN TIMES.

or of any other times, is the proposed passage under the strait between Dover and Calais, which will, or would have the effect of renewing more intimately and far more profitably the ancient intercourse between France and England—an intercourse for ages of mutual jealousy and war, leading the people on either side to look on those on the other as "natural en-

emies"—to use the very British expression of that especial Briton, Charles James Fox. But nature has no part in the antipathies which grow up between near neighbors, and Napoleon was wise enough to understand his geography. In 1802 he encouraged the plan of M. Mathieu to unite the two countries by a tunnel, or something like a floating bridge, after the manner of the *polygomphon odisma*, or floating causeway, built once upon a time by King Xerxes across the Hellespont. The idea was rather a wild one for that time, but Napoleon, who had no hatred of the English, favored it, taking occasion to say that England and France united could be masters of the world—a "Napoleonic idea," which subsequently influenced the policy of his nephew, Napoleon III. But the fierce war came instead of the viaduct. In more peaceful times, over fifty years ago, M. Tessie de Mottray and Franchot suggested the laying of a huge cast-iron tube in sections along the bed of the strait between the French and English coasts. Another projector, M. Payerne, proposed a scheme of vast moles from each side and a long bridge of solid masonry in the middle, strong enough to cope with the elements of that stormy channel. The Englishmen, Winton, Colburn, Chalmers, Cowan, Page and others, were rather in favor of Mottray's plan of laying down the huge tubes of cast iron, while many others contended for the long bridge, with enormous piers and openings at intervals for the passage of ships.

For many years this great idea has been agitating the minds of English and French speculators and engineers, and at last a balance of possibilities has resulted in a decided purpose. On the 24th of last January M. Calliaux, French Minister of Public Works, introduced into the Assembly a bill for the formation of a tunnel under the strait of Calais, naming it a *Projet d'Utilité Publique*. This bill was passed. The application for the concession has been deposited with the government, and signed by Michael Chevalier, G. Bergeron, Paul Christoffe, Lord R. Grosvenor, Sir W. Howes, F. Kuhlmann, of Lille, P. Talabot, Thome de Gamond, and other men of note and influence. Under this bill two bodies, composed of capitalists and engineers, have been associated, one to act in England and the other in France, each to carry on from its own side a series of surveys and explorations preliminary to the main undertaking, and each company is to work on its own capital of 2,000,000 francs, or over £80,000 sterling. The French company is the *Societe des Etudes*, administered by a committee of which M. Chevalier is chairman. Already Messrs. Rothschild have subscribed one-quarter of the capital on the French side, and the French Northern Railway Company one-half of the same. On the English side Sir John Hawkshaw is the engineer-in-chief, and the Southeastern and London and the Chatham and Dover Railroad Companies are largely interested in the enterprise, as they well may be; while Mr. Brunton, the well-known engineer, has invented a new borer which will do even better than that used in the Mont Cenis tunnel. On the French side M. Lesseps, constructor of the Suez Canal, is ardently engaged in the course of the strait tunnel, and has recommended it in an address delivered before the Academy of Science. Indeed, the Frenchmen are more *entetees* on this matter than the English, believing they would be the greatest gainers by the achievement.

## THE TWO PRELIMINARY COMPANIES

will now proceed to survey the road they mean to travel. They already know, of course, the soundings of the strait between the Bay of St. Margaret, near Dover, and Sangatte, near Calais, a distance of about thirty-two miles. These soundings vary from about 80 to 180 feet. But the nature of the formation under the channel at a depth of 200 or 300 feet is not known; and this must be ascertained. If the hard pan of the bottom is chalk, like the formation of the land on both sides, the projectors will have solid encouragement to proceed. If, on the contrary, the bed of the strait should be of sand and alluvial earth, to a depth of 300 feet and more, they would scarcely attempt to make a tunnel over thirty miles long through such a dangerous medium. This is

the uncertainty, and to solve the matter will be the first duty of the companies. To that end each will sink its own shaft on its own shore, to a depth of 300 or 400 feet, sufficient to show whether or not the land stratum of chalk extends downward on each side beneath the channel of the strait. Should it be found to do so on both sides, it would naturally be concluded that the chalk is in the middle also, to furnish a solid roof for the excavation, and not such a sandy roof as broke so disastrously into the works of the Thames tunnel. For this experiment the companies are sinking their respective shafts and *galeries d'essai*, or trial galleries. It is estimated that the cost of the tunnel would be 100,000,000 francs, or about £5,000,000 sterling, and that the work could be completed in three years. The French are highly interested in the project, since they lie in the track of a great railway such as will yet connect England with the Euphrates and Hindostan. The English are cautiously inquiring about the ventilation of such a tunnel. But it is considered that the Hawkshaws, Brasseys, Lesseps and other men of science who advocate the scheme would not do so if a sufficient current of air could not be maintained in the passage. At any rate, this subject will be investigated by the two preliminary companies.

## A TALK ABOUT TUNNELS.

(in *esse* or *posse*) cannot well conclude without some allusion to another which would enable New Jersey to "cast out her shoe," Scripturally speaking, over the profitable Island of Manhattan, and be an achievement to throw into the shade its diminutive precursor of the Thames. The company proposing to construct this passage, about a mile long, from Fifteenth street, in Jersey City, to Christopher street, in New York, has got its sanction under a general railway law of the sister State, and its prospectus and plan have been made known to the public. Meantime, as an injunction has stopped the work in *limine*, there is as yet no real progress to report. But the Hudson Tunnel will be a great fact some day, and that no very distant one. In a few years New York will have its rival wonders of engineering skill to exhibit—her gigantic bridge of the East River above, and her tunnel of the Hudson below; two art achievements which will be somewhat in keeping with the natural grandeur of our harbor, and give the city a metropolitan dignity worthy of its wealth and inevitable expansion.—*New York Times*.

## Appropriations for Contested Election Expenses.

In the U. S. House of Representatives, in committee of the whole, March 1, an amendment to the Sundry Civil Appropriation Bill, appropriating various sums to thirteen contestants and contestees for their expenses in election contests, was offered by Mr. Smith, of New York, and the following is a part of the discussion which ensued, as reported in the *Congressional Record*—

Mr. SMITH, of New York. I desire to say a single word in support of the amendment. The Committee on Elections has adopted the rule in making these recommendations to recommend the payment of the expenses in no case except where the committee was unanimous.

I was saying that the committee went upon the principle of making no recommendation except where the committee was unanimously of opinion that the contest was instituted in good faith and for probable cause, and I submit that the House can adhere to the rule which the committee has adopted with perfect safety.

There seems to be, Mr. Chairman, a misapprehension as to the amendment of the law in the last Congress. There was no provision of law that these expenses should not be paid under any circumstances, but in an appropriation bill a clause was inserted that these expenses should not be paid out of the contingent fund of the House. There were very good reasons for this. The law prescribes that the contingent fund of the House should only be used to pay the ordinary expenses of the House, whereas the expenses of the contestant and contestee were not among the ordi-