Robert Stephenson on Railways.

Robert Stephenson, M. P., having been elected President of the Institution of Civil Engineers in London, gave an excellent inaugural address on taking the chair, on the 8th ult. The following is a condensed summary of it :—

"Railroads now spread over Great Britain and Ireland like a net-work, to the extent of 8054 miles. In length they are equal to the 10 largest rivers of Europe united. The cost of these lines has been £286,000,000, equal to one-third the amount of the national debt. There are 50 miles of tunnels; 11 miles of viaduct in the vicinity of London alone; the earthworks excavated measured 550,000,000 cubic yards—a mass of earth sufficient to raise a pyramid a mile and a half high, with a base equal in area to St. James's Park. The trains run 80,000,000 miles annually; 5000 locomotive engines and 150,000 vehicles compose the running stock; the engines in a straight line would reach to Chatham, and the vehicles from London to Aberdeen. The companies employ 90,400 officers and servants directly, and upwards of 40,000 collaterally—130,000 men, representing a population of 500,000 persons, or 1 in 50 in the entire community dependent on railways. The engines consume annually 2,000,000 tuns of coal, 4 tuns every minute, flashing into steam 20 tuns of water—an amount more than sufficient for the wants of the population of Liverpool. The coal consumed by the engines is nearly equal to the whole amount exported to foreign countries, and one-half the annual consumption of London.

Last year 111,000,000 passengers traveled by railway, each averaging a journey of 12 miles. The receipts were £20,215,000, and there is no instance on record in which the receipts of a line has not been of continuous growth, even where portions of its traffic had been abstracted by competition on new lines. The wear and tear is great; 20,000 tuns of iron have to be replaced annually, and 26,000,000 sleepers perish every year. To supply these 300,000 trees are felled annually, which could be grown on little less than 5000 acres of forest land. He then suggested various means for meeting these unavoidable outlays for deterioration, which after a few years reach an annual average, as well known as the cost of fuel, and should be admitted as an annual charge against receipts.

"Nothing was so profitable as passenger traffic. An average train will carry 100 persons, and the cost was under 15d. per mile; 100 passengers produced, at five-eighths of a penny per mile, 5s. 2 1-2d. Minimum fares paid best on short routes, but with respect to the higher fares, greater expenses were incurred for increased comfort and accommodation.

"The postal facilities afforded by railways were very great. But for their existence Mr. Rowland Hill's plan of penny postage never could have been effectually carried out. Railways afforded the means of carrying bulk which would have been fatal to the old mail coaches. For this great blessing, therefore, the nation had to thank the railways.

The electric telegraph—that offspring and indispensable companion of railways—was next considered. 7200 miles of telegraph, or 36,000 miles of wires, were laid down, at least. 3000 people were continually employed, and more than 1,000,000 public messages were annually flashed along this "silent highway." To the working of railways the telegraph had become essential. The needle was capable of indicating at every station whether the line was clear or blocked, or if accident had anywhere occurred. The telegraph could, therefore, do the work of additional rails, by imparting instantaneous information to the officers, and enabling them to augment the traffic over those portions of the line to which their duty might apply. As a perpetual current was passing through the wires, the guard or engine-driver had only to break the train-wire in case of accident, and the officers at the nearest station were instantaneously apprized that something was wrong, and that assistance was needed.

"Railway accidents occurred to passengers in the proportion of one accident to every 7,195,343 travelers. Ladies and gentlemen could scarcely sit at home at ease with the impunity with which it appeared that they could travel by railway. How frequent, comparatively, were the accidents in the streets; how fearful the misadventures to those 'who go down to the sea in ships.' Yet Parliament had seen fit to legislate expressly for accidents by railway without legislating in the same way for accidents from other sorts of locomotion. This was unfair to railways, and ill-calculated to afford protection to the public where it was needed.

The moral results of railways were equally remarkable: railways were equalizing the value of land throughout the kingdom by bringing distant properties practically nearer to the center of consumption, and by facilitating the transit of manures, thus enabling poor lands to compete with superior soils. Before railways existed internal communication was restricted by physical circumstances; the canal traffic was dependent on the supply of water at the summit levels, and upon the vicissitudes of seasons of either drouth or frost. Railway communication was free from all those difficulties, and every object that nature had opposed, science had hitherto effectually surmounted."

The legislation of Parliament of which Mr. Stephenson complained, is, no doubt, one reason why accidents on English railroads are so few in number. All our railroad companies will do well to lay to heart the benefits of the railway telegraph. The N.Y. and Erie R.R. has found it to be a great saving. When will the time come that our railroads will be as safe as those in England? While we have over 19,000 miles of railroads to the 8000 of Great Britain and Ireland, ours cost only $589,920,000, Englands' cost $1,430,000,000. R. Stephenson is the son of George, the builder of the *Rocket*, the first successful passenger locomotive.

Fullers Earth.

MESSRS. EDITORS—The supposed soap mine found in the Table Mountain, California, and recently mentioned in the SCIENTIFIC AMERICAN, is beyond doubt a bed of Fuller's earth. The very place to find it is among silicious mountains, for its chief ingredient is fifty-three per cent. of impalpable silex, combined with from ten to twenty-four of alumina, twenty-four water, a small quantity of magnesia, and colored of a greenish brown with oxyd of iron. Its being found in conjunction with pipe clay is direct proof of its identity, for the best quality of pipe clay contains nearly twenty per cent. more silex, twenty-five per cent. more alumina, and only ten of water.

To test Fuller's earth it is first dried, put into a basin and covered with water, when it will fall into a paste as soft as soft soap. It is also tested with an acid, and if any effervesence is observed it is unfit for the use of the fuller. It is used as a cleanser, to remove dirt, grease, and any remains of soap from cloth. It is a far better cleanser than soap, but produces the reverse effect in felting, as it leaves the pores of the wool and the thread more open than before it was used. All woolens colored in the piece, except for black, are first cleansed with fullers earth; and blues, and some other very dark colors, are cleaned with it. Fuller's earth, or pipe clay, is used to make the brown soaps so much esteemed.

Fuller's earth is a very rare mineral, more being found in England than on the whole continent of Europe. During the last English war I was informed that it could be found around the coast of Rhode Island. I spent two days searching for it, but found nothing better than common clay. About thirty years ago I sent an article to the *Statesman*, describing fullers earth, and requesting that samples might be sent me bearing any appearance to it. Out of one hundred samples sent me, only one, from Virginia, contained fullers earth, and that was so full of sand and gravel as to render it worthless. Our market, therefore, is supplied from England. WM. PARTRIDGE.

Binghamton, Feb. 4, 1856.

Sharpening Files by an Acid.

I see in your paper of Jan. 26th, an extract from the *National Intelligencer*, headed "Sharpening Edged Tools." I have used and seen used, for some time, dilute acid, in sharpening files, thus causing, as I believe, a great saving. The principle upon which the sharpening is effected, is, that a file tooth or edged tool presents two sides and but one edge, and while the acid combines with and takes from the edge, it removes a like amount from each side, thus reducing the thickness of edge. J. A. M.

The Teeth and Management of Circular Saws.

MESSRS. EDITORS—The number of teeth a saw should have varies under different circumstances. In most mills they have thirty, which, generally, is too many, as the feed seldom exceeds 1 1-4 inches to each revolution of the saw, which gives each tooth but 1-24 of an inch to cut. A saw-tooth, when properly dressed, will cut 1-8 of an inch at once, in most timber, requiring but a little more power to cut 1-24, because the additional power is only required to split the saw-dust from the log, in lengths of 1-8 instead of 1-24 of an inch, an operation which is easily performed, as the fibers of timber offer but little resistance to their separation. There is a limit, however to the amount each tooth will cut out advantageously, and it varies in different kinds of timber. The fibers of such timber as is difficult to split require to be cut in shorter lengths than that which splits easily. My opinion is, that a saw-tooth should cut at least 1-16 of an inch in the worst, and about 1-4 in the best timber; and where there is not sufficient power to secure this result every alternate tooth should be broken out; for 12-horse power, fifteen teeth in a saw are sufficient. Where less than 12-horse power is employed, the diameter of the saw should not exceed 48 inches. Indeed, the employment of two saws of small diameter, one placed above the other, results in a considerable saving of power, in most instances. In cases where the majority of lines do not exceed 12 inches in depth, two saws, each 32 inches in diameter, should be employed. They cost $33, and cut a line of the same depth that a 58 inch saw cuts, which costs $170. The small saws, being thinner, cut a smaller kerf, and consequently consume less power. The saving of power is manifest, because the tooth is much nearer the center of the saw, and therefore exerts less leverage against the engine. The greatest objection to the employment of two saws lies in the difficulty of keeping them in line; but as the upper saw is chiefly used in reducing the log to the proper size for making plank, the seam comes off on the edge of one plank, and does not materially injure the lumber. A small saw is also easier kept in line than a large one, and the saving in cost, power, and timber, amply repays for what little additional attention is required.

The shape of the tooth is a matter of great importance. It should have as much pitch as possible, so as to cut, instead of scrape out the saw-dust, yet care should be taken that it is not so slender as to break. No more should be filed from the back of a tooth than is necessary, to prevent it from rubbing the log, and all the metal which is not required to strengthen the tooth should be filed from the front of the tooth, in order to give it as much pitch as possible. J. W. GAREY.

Granada, Miss., Jan. 1856.

Our Climate not Changed.

MESSRS. EDITORS—In the SCIENTIFIC AMERICAN for Jan. 12th I observed an article on the vexed question of "change of climate." I send you a table of thermometrical observations by Dr. Daniel Drake, late of Cincinnati, which will go to show that the climate in this particular part of the world has not changed, when compared with recent records:

1806	54·10 deg.
1807	54·40 "
1808	56·40 "
1809	54·40 "
1810	52·77 "
1811	56·62 "
1812	52·05 "
1813	52·76 "

The above table exhibits the mean annual results of eight years, the average being about 54 1-4 degrees. From an article in the Patent Office Report for 1853, I find the mean annual range of the thermometer at Cincinnati for the last eighteen years to be 53 7-10 degs.

A READER.

Washington, Ky., Feb. 1856.

Cheap Steam Engines for Farmers.

MESSRS. EDITORS—Let me reply briefly to your correspondent "Farmer," of Chicago, Ill. First, he is right about the frailty of all the corn-stalk cutters in use, and the fault is not with inventors that they are trifling, and "forever out of kilter," but with farmers.—The principles of some of the machines now in use are well enough for efficient and rapid work, but not one "Farmer" in five hundred is willing to pay the cost, and a fair profit on such a construction as will make the machines substantial and durable, and no manufacturers can afford to prepare plans and patterns, and constructs machine for a few purchasers that he must hunt up in one and another State of the Union.

Second, he wants iron feed troughs; he can have them to any amount by paying what they are worth, and I venture there is not a foundry in the States that have not talent enough to construct suitable patterns if "Farmer" will give them his plan, and to make "nice light cast-iron feed troughs."

Third, "but most of all he wants a cheap and simple steam engine. If the steam engine could be so cheapened and simplified that one of sufficient power for farm uses could be made for $100 or $125, their sales would be far more extensive, &c."

Aye, there's the rub Mr. "Farmer;" engines for farm use have been made thus simple, thus cheap, but they were "always out of kilter," and farmers, by waiting for the good times of perpetual motion, when they could get "something for nothing," have lost millions of dollars to the farming interests of the country. I believe I am familiar with every variety of portable farm engine, that has yet been introduced extensively in this country or in Europe, and venture to say that, with the price of metals at their present standard, no manufacturers will ever succeed in making small sizes of portable engines, with the necessary attachments of pumps, pipes, cocks, valves, chimney, &c., and so constructed as to be safe, to use in and around barns, and to carry high steam, for less than $100, per horse power, and I know no good plan yet that will enable manufacturers to sell, even at that price, below 6 horse power. "Farmer" should know that for four horse power engines he must have at least 50 to 60 feet of active fire surface to his boiler, and to be safe it must be strong. The locomotive form of boiler seems yet best adapted to such use, and in its simplest form (for a four horse boiler, safe under 150 lbs. of steam,) such boiler will weigh about 1200 lbs., and I suppose cannot be afforded at less than 17 cts. per pound finished with its tubes in, which will give us $204 as cost of boiler. The balance of the work cannot be well done and of good proportions and materials, for less than $250, and afford a reasonable profit to the manufacturer. Farmers must learn, as mechanics and manufacturers have, by bitter experience, that to have power, we must have strength of construction, good proportions in parts, and an intelligent supervision in running engines, and when they are willing to pay for good machines as others who wish good power do pay, they will get what they require, but to ask for a good engine for farm purposes for $125 is but a poor means to encourage efforts to supply farm engines. JOSEPH E. HOLMES.

Newark, G., Jan. 8, 1855.

Alteration of Coast Lights.

The many changes already made, or in contemplation, in the character of lights along our coast, viz.: from steady to revolving or flashing lights, and *vice versa*, will, we fear, cause much loss of life and destruction of property. Changes of this kind should never be made without at least twelve months' public notification of the contemplated alterations. The Boston (Mass.) *Journal* states that two vessels have already been lost on the coast of Massachusetts, from the removal or change in the character of lights long established and familiar to mariners.

Mechanical Ball.

Messrs. Singer & Co., the celebrated Sewing Machine manufacturers of New York, give a grand ball and supper on the 13th inst., to their employees and customers. It is to be a splendid affair.