Plank Roads.

THEIR CONSTRUCTION.—In the most generally approved system, two parallel rows of small sticks or timber (called indifferently sleepers, stringers or sills) are imbeded in the road, 3 or 4 feet apart. Plank, eight feet long and three inches thick, are laid upon those sticks across them, at right angles to their direction. A side track of earth, to turn out upon, is carefully graded. Deep ditches are dug on each side, to ensure perfect drainage; and thus is formed a plank road.

LAYING THEM OUT.—In laying out a plank road, it is indispensable, in order to secure all the benefits which can be derived from it, to avoid or cut down all steep ascents.

A very short rise of even considerable steepness may, however, be allowed to remain, to save expense; since a horse can, for a short time, put forth extra exertion to overcome such an increased resistance; and the danger of slipping is avoided by descending upon the earthern track.

A double plank track will rarely be necessary.

No one without experience in the matter can credit the amount of travel which one such track can accommodate. Over a single track near Syracuse, 161,000 teams passed in two years, averaging over 220 teams per day, and during three days 720 passed daily. The earthen tur-out track must, however, be kept in good order; and this is easy, if it slope off properly to the ditch, for it is not cut with any continuous lengthwise ruts, but is only passed over by the wheels of the wagons which turn off from the track and return to it. They thus move in curves, which would very rarely exactly hit each other, and this travel, being over the earth, tends to keep it in shape rather than to disturb it.

COVERING.—The planks having been properly laid, as has been directed, should be covered over an inch in thickness with very fine gravel or pebbles, from which all the stones or pebbles are to be raked, so as to leave nothing upon the surface of the road that could be forced into and injure the fibres of the planks.—The grit of the sand soon penetrates into the grain of the wood and combines with the fibres and the dropping upon the road to form a hard and tough covering like felt, which greatly protects the wood from the wheels and horses' shoes. Sawdust and tan-bark have also been used.

The road is now ready for use.

LAYING.—The planks should be laid directly across the road, at right angles, or 'square,' to its line. The ends of the planks are not laid evenly to a line, but project three or four inches on each side alternately, so as to prevent a rut from being formed by the side of the plank track, and make it easier for loaded wagons to get upon it, as the wheels, instead of scraping along the ends of the planks when coming towards the track obliquely after turning off, will, on coming square against the edge of one of those projecting planks, rise directly upon it. On the Canada roads every three planks project three inches on each side of the road alternately.

DURABILITY.—A plank road may require a renewal, either because it has worn out at top by the travel upon it, or because it has been destroyed at the bottom by rot. But, if the road have travel enough to make it profitable to its builders, it will wear out first, and if it does, it will have earned abundantly enough to replace it twice over, as we shall see presently. The liability to decay is therefore a secondary consideration on roads of importance.

DECAY.—As to natural decay, no hemlock road has been in use long enough to determine how long the plank can be preserved from rot. Seven years is perhaps a fair average. Different species of hemlock vary greatly; and upland timber is always more durable than from low and wet localities. The pine roads in Canada generally last about eight years, varying from seven to twelve. The original Toronto road was used chiefly by teams hauling steamboat wood, and at the end of not six years began to break through in places, and not being repaired, was principally gone at the end of ten years. Having been poorly built, badly drained, not sanded and no care bestowed upon it, indicates the minimum of durability. Oak plank cross-walks are in Detroit, the plank being laid flat as on those of pine. It is believed that oak plank, well laid, would last at least twelve or fifteen years. One set of sleepers will outlast two plankings. Several Canada roads have been relaid upon the old sleepers, thus much lessening the cost of renewal.

Electro Magnetism as a Motive Power.

At a recent meeting of the Society of arts in London, Mr. R. Hunt an author of no mean celebrity, read a very interesting paper, on this subject of which the following is an abstract: "He called attention, in the first place, to the numerous attempts which have been made to apply electro-magnetism as a power for moving machines and particularly described the apparatus employed by Jacobi, Dal Negro, M'Gauley, Wheatstone, and others, noticing incidentally the machines recently constructed by Mr. Hjorth. Since, notwithstanding the talent which has been devoted to this interesting subject, and the large amount of money which has been spent in the construction of machines, the public are not in possession of any electro-magnetic machine which is capable of exerting power economically; and finding that, notwithstanding the aid given to Jacobi by the Russian Goverment, that able experimentalist has abandoned his experimental trials,—the author has been induced to devote much attention to the examination of the first principles by which the power is regulated, with the hope of being enabled to set the entire question on a satisfactory basis.

The power of electro-magnets the author stated, could be increased without limitation. A voltaic current produced by the chemical disturbance of the elements of any battery, no matter what its form may be, is capable of producing by induction a magnetic force, this magnetic force being always in an exact ratio to the amount of matter (zinc, iron, or otherwise) consumed in the battery. Several forms of the voltaic battery were explained, particularly those of Daniell, Grove Bunsen, and Reinsch, the latter being constructed without metals, depending entirely on the action between two dissimilar fluids, slowly combining. He had, however, proved, by an extensive series of experiments, that the greatest amount of magnetic power is produced when the chemical action is the most rapid. Hence in all machines, it is more economical to employ a battery of intense action, than one in which the chemical action is slow. It has been proved by Mr. Joule, and most satisfactorily confirmed by the author, that one-horse power is obtainable in an electro-magnetengine, the most favourably constructed to prevent loss of power, at the cost of 45 lbs. of zinc, in a Grove's battery, in 24 hours, while 75 lbs. are consumed in the same time to produce the same power in a battery of Daniell's construction. The cause of this was referred to the necessity of producing a high degree of excitement, to overcome the resistance which the molecular forces offer to the electrical perturbations, on which the magnetic force depends. It was contended, that although we have not perhaps arrived at the best form of voltaic battery, yet that we had learnt sufficient of the law of electro-magnetic forces to declare that, under any conditions, the amount of magnetic power would depend on the change of state—consumption of an element—in the baterry, and that the question resolved itself into this:—

What amount of magnetic power can be obtained from an equivalent of any material consumed? The following were regarded as the most satisfactory results yet obtained:—1. The force of voltaic current being equal to 678, the number of grains of zinc destroyed per hour was 151, which raised 9000 lbs. one foot high in that time. 2. The force of current being, relatively, 1300, the zinc destroyed in an hour was 291 grains, which raised 10,030 lbs through the space of one foot. 3. The force being 1000, the zinc consumed was 223 grains; the weight lifting one foot 12,672 lbs. The estimations made by Messrs. Scoresby and Joule, and the results obtained by Oersted, and more recently by Mr. Hunt, very nearly agree; and it was stated that one grain of coal consumed in the furnace of a Cornish engine lifted 143 lbs. one foot high, whereas one grain of zinc consumed in the battery lifted only 80 lbs.—The cost of 100 cwt. of coal is under 9d; the cost of 1 cwt. of zinc is above 216d Therefore, under the most perfect conditions, magnetic power must be nearly 25 times more expensive than steam power. But the author proceeded to show that it was almost proved to be an impossibility ever to reach even this, owing, in the first place, to the rate with which the force diminishes through space. As the mean of a great many experiments on a large variety of magnets, of different forms and modes of construction, the following results was given:

Magnet and armature in contact, lifting force	- - - -		220 lbs.
"	distant 1-250	of an inch	90 6
"	" 1-125	"	50 7
"	" 1-63	"	50 1
"	" 1-50	"	40 5

Thus at one fiftieth of an inch distance four-fifths of the power is lost. This great reduction of power takes place when the magnets are stationary. The author then proceeded to show that the moment they were set in motion a great reduction of the original power immediately took place; that, indeed, any disturbance produced near the poles of a magnet diminished, during the continuance of the motion, its attractive force. The attractive force of a magnet being 150 lbs. when free of disturbance, fell to one half, by occasioning an armature to revolve near its poles. Therefore, when a system of magnets which had been constructed to produce a given power is set in revolution, every magnet at once suffers an immense loss of power, and consequently their combined action falls in practice very far short of their estimated power. This fact has not been before distinctly stated, although the author is informed that Jacobi observed it. And not merely does each magnet thus sustain an actual loss of power, but the power thus lost is converted into a new form of force, or rather becomes a current of electricity, acting in opposition to the primary current by which the magnetism is induced. From an examination of all these results, Mr. Hunt is disposed to regard electro-magnetic power as impracticble, on account of its cost, which must necessarily be, he conceives, under the best conditions, fifty times more expensive than steam power, and is at present at least 150 times as expensive.

[We wonder what has become of the Report of a Committee of one, an examiner of the Patent Office, to whom was granted $30,000 last year by Congress to make experiments on Electro Magnetism as a motive power. These things are worth looking after; Uncle Sam's funds belong in trust to his children, and it is right they should know something about "how the money goes;" $30,000 is a sum not to be sneezed at. We hope a full report on the subject will issue from this labyrinth of all things curious—men and things—the Patent Office.

Wonderful Case of Injury to the Brain, and Health Restored.

The American Journal of Medical Science, for this month, contains an account of one of the most remarkable cases that ever we have read, by Prof. Bigelow, of Harvard University. It relates to a young man named Phineas P. Gage, who had a huge iron shot through his brain, and strange to say he is now *living* and in general health.

On the 13th Sept., 1848, Phineas P. Gage, a young man of twenty five, "shrewd and intelligent," a contractor or head workman on the Rutland and Burlington Railroad, had charged with gunpowder a hole drilled in the rock, and directed his assistant to fill in the sand; supposing which done, he dropped his tamping iron into the hole to drive the sand home. It happened, however, through some inadvertence, that the sand had not been poured in; and the iron striking fire upon the rock, the powder was inflamed and the accident produced by the iron being blown out like a ramrod shot from a gun. The tamping iron was a round rod three feet seven inches in length, and an inch and a quarter in diameter, tapering to a point at the top, and weighing thirteen and a quarter pounds. The whole of this immense weight and length—this bar or bludgeon of iron—was driven through Gage's face and brain, as he stooped over the hole, in the act of tamping the sand. It struck him on the left cheek just behind and below the mouth, ascended into the brain behind the left eye, passed from the skull, which it shattered and raised up, "like an inverted funnel," for a distance of about two inches in every direction around the wound, flew through the air, and was picked up by the workmen, "covered with blood and brains," several rods behind where he stood. Gage, who was also more or less scorched, was prostrated, apparently less by the blow of the iron than the force of the explosion. He fell on his back, gave a few convulsive twitches of the extremities, but "spoke in a few minutes." His men placed him in an ox cart, in which he rode three quarters of a mile to his lodgings, sitting erect; got out of the cart himself, and with but little assistance; walked to the piazza and afterwards up stairs, talking rationally to the physicians and giving them a clearer account of the accident than his friends could; occasionally vomiting up blood, the effort of which caused haemorrhage from the wound, with the actual loss of a considerable portion of the substance of the brain. The left eye was dull and glassy, but was sensible to the impression of light. Gage bore his sufferings with heroic fortitude, telling Dr. Williams, "here is business for you," and expressing to Dr. Harlow the hope that "he was not much hurt."

For the first ten days everything went on well, Gage being, with some intervals of natural delirium from fever, pretty rational and hopeful; that, at the close of this period, he lost the sight of the left eye, and lay for nearly a fortnight in a semi-comatose state or partial stupor; that he then began to improve in body and mind; was, within two months, walking about in the street, in defiance of instructions; suffered a relapse in consequence; and, finally, being recovered from this, was, in the tenth week, free from pain and rapidly convalescing.

"The leading feature of this case," says Prof. Bigelow, "is its improbability. A physician who holds in his hands a crowbar, three feet and a half long, and more than thirteen pounds in weight, will not readily believe that it has been driven with a crash through the brain of a man who is still able to walk off, talking with composure and equanimity of the hole in his head." Prof. B., who justly describes the case as one "perhaps unparalleled in the annals of surgery," says that he was "at first wholly sceptical," but that he was personally convinced. Mr. Gage, as we said, visited Boston in January, and was for some time under the Professor's observation, who had his head shaved and a cast taken; which, with the tamping iron, is now depsited in the Museum College. At that time, the wounds were perfectly healed, the only vestiges of the accident being blindness and an unnatural prominence of the left eye, with paralysis of the lids,—a scar on the cheek, and another on the skull showing the irregular elevation of a piece of "about the size of the palm of the hand,"—and, behind it, an irregular and deep hollow several inches in length, beneath which the pulsations of the brain were perceptible.—"Taking all the circumstances into consideration," says Prof. Bigelow, "it may be doubted whether the present is not the most remarkable history of injury to the brain, which has ever been recorded."

Pictish Castles.

A writer in the "John o'Groat Journal," says they have been pulling down the Pictish Castles on the little island on the fresh water loch called Cleikimin, near Lerwick (Zetland,) described with such minuteness by Scott in his journal, till very few traces of its original construction are left. If the enclosing of lands proceed as it has begun, these curious monuments of a race which has long since perished, will disappear.

These castles have small rooms for a strange departed race of men about four feet high.

[Those who do not know what the Pictish Castles mean, should read Lockhart's Life of Scott.