Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park-row (Park Building), New York.

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TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.

Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

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VOL. I., No. 10.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 3, 1859.

MAGNETISM ON RAILROADS.

MAGNETISM is one of the most subtile and wonderful agencies of nature, and the genius of man has been exercised in a thousand modes to render its power subservient to his purposes. In this he has been successful in applying it to the compass for navigation and surveying, and to the magneto-electric machine, which is employed to a very limited extent in England for electro-plating. The usefulness of the compass depends upon its needle assuming a position by which its poles are attracted to point continually north and south, being thus directed by the great magnetic currents of the earth. In itself the magnet possesses a great attractive force for drawing certain metals towards it and retaining them in contact, and it was by this peculiar property originally known. It was supposed by some nations, during the dark days of superstition, that a spirit dwelt in the loadstone, which, in certain cases, exercised its power for evil purposes, and many shipwrecks were once attributed to its influence. Imagination fixed huge magnetic rocks in several dangerous seas, which drew out every spike and fastening from all vessels that came within their influence, and down went every one on board to the bottom of the deep. The story of "Sinbad the Sailor" and his shipwreck at the loadstone mountain is founded upon actual tradition.

The inherent attractive force of the magnet, as it costs nothing, has been frequently the subject of study to inventors, as affording a probably, cheap and constant power for moving machinery, and also for securing perpetual motion. This never can be effected; neither a constant rotary nor reciprocating rectilinear motion in machinery can be produced by permanent magnets, as the attractive force requires to be nullified or suspended in order to produce motion in an opposite direction. There is another kind of magnet, however, by which machinery may be moved; but this is owing to a totally opposite principle in it from the loadstone. The magnetism of the latter is permanent, that of the former is temporary—it is a powerful magnet this instant, a piece of inert iron the next. This is the electro-magnet. It is composed of a piece of very pure soft iron forming the core for a helix of insulated copper wire wrapt around it. When the ends of the helical wire are placed in the circuit of a voltaic battery, the soft iron at once becomes a powerful magnet; but when the circuit is broken, the iron as suddenly ceases to attract. By placing a series of such magnets in a circle or in a line, and throwing the voltaic current alternately from one to the other by keys, to attract a wheel or a piston, rotary and reciprocating electro-magnetic engines, like those of Professors Page, Vergnes, and others, have been produced. Such motors are too expensive for operating machinery, in general, in comparison with steam and water power; but for some situations and purposes, such as for small machines like those used for sewing, which require to be frequently stopped and set in motion, they may yet be applied with convenience and economy.

Another application of such magnetism has recently been brought in a very prominent manner before our people, viz.: magnetizing the driving-wheels of locomotives to increase their traction on the rails, as noticed in our last issue. The paper read on this subject before the late meeting of the Association for the Advancement of Science, related the experiments of E. W. Serrell, C. E., in testing the efficacy and utility of such magnets for this purpose. With two batteries of intensity, containing 16 cups each, having 300 square inches of zinc surface, a magnetic attraction, equal in power to 38 pounds of steam pressure on the square inch of piston area, was obtained between the rails and the wheels, or, as has been stated, an additional adhesion of seventy-five per cent. The lower segments of the two driving-wheels were fitted with insulated helices of No. 8 copper wire, each 2,700 feet long. The wheels were four and a half feet in diameter and weighed 1,100 lbs. each; one wheel had south and the other north polarity. On a very slippery rail 19 lbs. of steam per inch slipped the wheels without magnetism; under the same conditions 35 lbs. were required to slip them when magnetized. On a very clean rail and everything being favorable, 50 lbs. of steam were required without any magnet, and 88 lbs. when magnetized.

This application of electro-magnetism was stated by Mr. Serrell not to be new, but that, from previously ascertained facts, all that had been done before him was of a discouraging character; and it was against "a unanimous *no*," to the probabilities of success, that he persevered and obtained such favorable results. In 1852, a German mechanic, named Nickles, tried similar experiments, and it was stated in *Chambers' Journal* that these had been made with large locomotives in full operation, and that they were quite successful. If they were, however, it is remarkable that they fell to the ground as undeserving the attention of engineers, and if the experiments of Mr. Serrell have been as effective and useful as it has been stated they were, we certainly have arrived at a new achievement in railroad operations deserving the attention of all men. It is calculated that $26,000,000 per annum is the cost of depreciation in our railroad structures, principally caused by the use of heavy locomotives, their great weight being required to produce the necessary traction. From this it has been inferred that, with locomotives of 20 tuns weight, having magnetized wheels, as much work can be done as with other locomotives weighing 40 tuns, and thus save a great amount of wear and tear in the rails and permanent way. Our opinion is at variance with such a conclusion, and we base our views upon the nature of the electro-magnet. The increased adhesion of a magnetized locomotive wheel is caused by inducing polarity in the rail, and it must take as much power to break the magnetic contact between the wheel and rail as that which induced their mutual attraction. According to this view, whatever is gained by increased adhesion is at the expense of steam power. While this is our opinion, we think Mr. Serrell deserves great praise for what he has done to test the question, and further experiments (which we understand are to be undertaken) may prove that his application of electro-magnetism may be profitably applied to every locomotive in our country. A correspondent (O. H. Needham, M.D., of this city) states, in a letter to us, that if he had been worth a few thousand dollars five years ago, his electro-magnetic brake, combined with an electro-magnet tractor, would now be embodied in all the locomotives running. He has perfect confidence in the utility, economy and adaptability of electro-magnetism to locomotives for producing new and important results.

THE LABOR QUESTION.

One of the greatest struggles that has ever taken place between employers and their workmen has lately been going on in London. As we understand the question, all the operative builders of that city resolved some time ago to obtain a reduction of the hours of labor from ten to nine, daily; and, in order to secure this result, they planned a campaign of aggression upon the most scientific strategetical principles. Their mode of operation was to demand their terms from each master-builder in succession, and to "strike" against only one at once, and those remaining at work were to support those on strike, until all the employers were vanquished in rotation. The master-builders having been informed of this skillfully-planned design, resolved to prevent the result which might flow from it by forming a counter combination, and demanding that all the operatives should abandon their position. This they refused to do; and the whole question, as it now stands, resolves itself into the simple fact, that the master-builders of London have struck against their operatives—about 90,000 in number—to prevent an anticipated reduction of the hours of daily labor. The journeymen-builders of London work 10 hours during the first five days of the week, and only eight on Saturday, and their wages is about $1.32 per day. Their employers waited upon the Home Secretary, Sir G. C. Lewis, in order to solicit his influence, and that of the House of Commons, against their workmen; but the Home Secretary snubbed them, and said "the government made no distinction between classes." He told them that if it were wrong, as they had expressed themselves, for the workmen to form combinations, it was equally wrong for them, as employers, to do so. The employers contend that the claims of the operatives are unreasonable and unjust; the latter retort, and say the same opposition and arguments were used in former times against reducing the hours of labor from 14 to 12, and from 12 to 10, "and if bank and government clerks work only six, seven and eight hours daily, why should mechanics, whose pay is smaller and labor more severe, work 10 hours per day?"

Public opinion in London and the whole kingdom appears to be on the side of the operatives, and it is believed that a compromise will soon be effected between them and their employers, as the subject has been taken up in the House of Commons, and a bill brought in to establish equitable councils of conciliation between such parties.

In the city of Albany, N. Y., a very extensive strike among the molders has been going on for some months, and far more to the injury of the employers than the operatives. Both parties are formed into opposing combinations, and each employer, it is stated, is pledged to a forfeit of some thousands of dollars if he submits to his molders' demands without the consent of all the other employers. In the neighboring city of Troy, N. Y., the master-molders acquiesced in like demands that were made by their operatives, and, as a consequence, they have large orders to fill which otherwise would have been executed in Albany; and much business has thus been diverted from the latter city.

The coal-miners in Pittsburgh, Pa., and its neighborhood, to the number of 3,000, are also out on a strike at present. They demand that the coal which they mine shall be weighed at the mouth of the pit, and not measured, according to the practice heretofore pursued. They assert that the cars by which their coals have been measured have been enlarged in size, and that they have to furnish more coal for the same compensation. The employers assert that it would be a great increase of their expenses to weigh the coal, and that it would be of no benefit to either party.

Several other minor strikes are now going on in various parts of our country, and the labor question appears to be assuming greater importance than it has done for a great number of years past. Those conflicts between capital and labor, which we call "strikes," are to be deplored, because they do injury to all parties. We would greatly rejoice if some means, such as courts of conciliation, were organized to prevent them by settling disputed questions upon equitable principles.

HINTS TO THINKERS.

In this world there are two lines of knowledge, two trains of thought the mind can follow, two roads on which the inquirer can travel—the positive and the speculative. Although they both start from the same point, yet like the boundaries of an angle, they continually diverge and lead in very opposite directions, to very different results. The starting point may be said to be, the God-implanted spirit of inquiry, and the results are, respectively, firm unshaken truth and doubtful wavering error. These are the extremes, the happy medium lies in the bi-section of the angle, hard fact enjoyed in conjunction with a regulated imagination. On this line lies what we call the poetry of science, the dignity of labor, and the majesty of toil. To illustrate:

The strata which is below the coal beds was particularly adapted for the growth of certain kinds of plants, which when they decayed or were imbedded, by slow decomposition have formed coal. This is the simple fact. But geology's poet—Hugh Miller—has brought the very scene before our eyes, has made us actors in the very epoch, and while scientifically accurate, has placed a halo of romance around this operation of nature. He blended actual fact and a vivid imagination, always (as he