The expense of impregnating railroad timbers by the method advocated by Mr. Hewson is quite small, but it is not claimed for it that the timber is superior to that treated by other methods. As it has been practically demonstrated that timbers charged with the antiseptic substances described, have had their durability increased to double the number of years of similar timbers in an unprepared condition, this question is one which deserves the earnest attention of all persons connected with railroads. The great reason why so many of our railroads have proved failures, so far as payment of dividends on the original stock is concerned, is owing to the vast amount involved in wear and tear of the materials, and for paying the working-expenses. One great item of expense is the rapidly-decaying timbers; therefore every dollar saved in this department by treating them as described above, will tend to advance the interests and increase the prosperity of the railroads.

OUR RAILROADS.

The progress and condition of our railroads forms an instructive chapter in *Stow's Capitalists' Guide and Railway Annual.* It would appear that in nine years, or from 1850 to 1859, the railroads of the United States increased from 7,355 to 27,944 miles in length. In this period the increase in the New England States amounted to 62.74 per cent, while in the eight of the western States the increase was 2,201.41 per cent. At the same time the former gained in population 16.12 per cent, and the latter 46.22. The total cost of the roads, up to 1859, amounted to $865,451,070, of which large sum it is supposed one-third had been wasted in construction; yet by their influence, lands have been advanced in value and the speed of internal communication greatly augmented, and the whole country benefited. There are at this time 28,000 miles of finished roads in the United States, and about 16,000 miles either under construction or projected, requiring $400,000,000 for their completion. It is estimated, however, that many years must elapse before sufficient capital can be diverted from other objects to carry them through. In the meantime, many projected in a spirit of rivalry to other roads will be abandoned. It is calculated that 20,000 miles of railroad are sufficient to do all the business of the country at the present time, and that 8,000 miles have been constructed, in part, in rivalry to other roads, which have proved a dead loss to stockholders, and in the main will pass into the hands of the bondholders. The average cost of railways per mile has been $36,328. In the middle States, $40,919; in the southern States, $22,906; and in the western States, $36,333.

The reason assigned for the cheapness of construction of railroads at the south is that they were built on the cash plan. Among the net earnings, the Panama shows the largest returns, being $29,564 per mile; and those earning the least, or nothing to stockholders, were found in Maine, Vermont, Mississippi, Missouri, Iowa, Illinois, New York, &c. The list of dividend-paying roads comprises 78; among which, two pay annual dividends of 12 per cent; nine, 10 per cent; two, 9 per cent; ten, 8 per cent; six, 7 per cent; thirty, 6 per cent; five, 5 per cent; one, 4 per cent; one, 2½ per cent; and one, 2 per cent. The list of delinquent companies on stock or bonds amounts to 33. The total bonded debts of the American railroads, all of which mature between 1859 and 1874, amount to $411,199,702.

STEAM-ENGINES FOR CITY RAILROADS.

We learn by the Philadelphia *Ledger* that the directors of one of the railroads in that city are now making arrangements for running their cars with a steam-engine. For this purpose one of four horse-power is being built by A. L. Archambault, and is nearly ready. It will be 10 feet long, 4 feet 8 inches wide and weigh about 2 tuns. It is intended to drive the truck of the engine by a belt passing round the pulley on the engine-shaft, thence around another on the hind axle of the truck. It is purposed to throw the wheels in and out of gear with the engine by a shipper, so that, when the signal is given to stop, the belt may be thrown off and the engine still kept in motion, and *vice versa*. At present we do not see the advantages of this roundabout arrangement, but probably it may have merits which have been carefully studied out by its projector. The railroad company are having a handsome car made to run with this engine, and its practicability will be fully tested.

MAGNETISM ON RAILROADS.

Messrs. Editors.—In your valuable paper of the 3d inst. (page 153, present volume of the Scientific American) you kindly noticed my efforts to introduce a substantial improvement in our railroad economy, for which accept my acknowledgements. You made one remark however, which it is perhaps well to refer to. You say: "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 the 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."

You are perfectly right in this, that whatever adhesive force exists must take a corresponding power to neutralize it. But as this is produced by chemical decomposition in the battery, it is not at the expense of the steam power of the engine. Again, whatever increase of adhesion there may be, it is concentrated at the point of contact between the wheel and rail by the curved form of the helices, and there operates continuously, and the contact has not to be made and broken as you evidently suppose, and therefore the forces are balanced exactly; although it requires much more force to lift or to *slip* the wheel when magnetized than when it is not, it requires no more to *roll* it in one case than the other, which has been determined on a four and a half-feet diameter wheel, the rationale of which you will readily see. A weight of 20 pounds at either end of a scale-beam may be vibrated as easily as 10 pounds similarly placed, if the fulcrum is not crushed, excepting the power necessary to overcome the inertia, and as the magnetic attraction is equally in front and behind, the point of greatest magnetic effect, which coincides with the point of contact between the wheel and rail, and as their is no appreciable inertia or vis-inertia in magnetism, it follows that the wheel will roll as easily when magnetized as when it is not, provided the point of maximum magnetic effect is continued at that point where the wheel and rail touch, whether at rest or in motion, which is the case with the arrangement of mechanism under discussion. The whole idea is concisely comprised in this: magnetic teeth to the wheel, and cogs to the rail.

Edward W. Serrell.

Greenfield, Mass., Sept. 5, 1859.

The following is another letter on this subject:—

Messrs. Editors:—I have been much edified by reading your able article in the edition of September 3d, on the subject of magnetizing the driving-wheels of locomotives; but I have ventured to address you again (as briefly as possible) as I believe you have overlooked the point upon which the value of the application of that power depends, both as regards my theory, and the results of Mr. Serrell's experiments, which latter go to show a gain of 75 per cent in tractive powers by the employment of an imponderable agent. An engine weighing 20 tuns, with the wheels magnetized will draw as much freight with the same amount of steam, as an engine weighing 35 tuns, can draw without magnetism; in other words, we obtain 15 tuns adhesion, by using an influence weighing nothing, and, it must appear obvious, that, if the depreciation of railroad structure be $26,000,000 annually, and caused principally by the use of heavy locomotives, a reduction of 75 per cent in their weight, without detracting from their efficiency or increasing their running expenses, must necessarily diminish this $26,000,000 in the same proportion. In my former letter, I stated it was my belief, that the slop and mess of coils and batteries could be dispensed with, by a peculiar construction of the driving wheels, rendering them powerful permanent magnets.

O. H. Needham, M.D.

New York, September 7, 1859.

[In our article referred to, we gave some reasons why the economy of magnetized wheels may not be so great as has been estimated; we want more experiments to test them under different conditions of speed, load carried, the expenditure for fuel, &c. The steel tires of driving wheels may be so contructed as to be made into permanent magnets, but we could not expect any benefit from their use; nevertheless we go for testing all these things by experiments.—Eds.

LEVER POWER IN PLACE OF STEAM OR WATER.

"Mr. E. Harris, of Princeton, in this State, who is one of the most ingenious and successful inventors in the West, has recently obtained a patent for a new contrivance for the propulsion of machinery, which, if successful, is destined to supercede steam or water power. It is lever power, operated by means of a heavy, swinging weight, attached to a pendulum that is fastened above to each end of a horizontal iron beam resting on a cylinder, which, by means of cog-wheel 'dogs,' operates a great overshot wheel that connects with and operates the general machinery. This is the entire arrangement, simple and apparently effective. Mr. Harris has his invention only in model form as yet, but designs to apply it practically as soon as possible. He feels confident of its practicability, and we see no difficulty in the way. The invention will be of the utmost importance if successfully put into practice, inasmuch as it can be as easily applied to steamboats, railroad cars, and common carriages as to saw-mills or any other kind of mills or machinery. We shall expect to hear of its entire success."

The *Wisconsin Cultivator* copies this from an "exchange," name not given. The writer of the extract is evidently not acquainted with mechanics. Levers are mere mechanical devices for applying steam, water, and animal power; they possess no vital energy for moving machinery, because they are machines themselves. It would just be as sensible to say, Mr. Harris has invented a machine to drive a machine, as to say this is "a new contrivance for the propulsion of machinery." For want of a very little accurate knowledge of mechanics, many men have spent years in contriving useless machines for affecting an impossible result, namely, gaining power by levers.

Molding Paraffine Candles.—If paraffine is run into molds and heated in the usual way for making candles like those of wax, it becomes cloudy, mottled on the surface and full of cracks and indentations. An improved method of rendering paraffine candles smooth on the surface and semi-pellucid in appearance, was patented by Horatio Leonard, on the 8th of February last. The invention consists in first heating the molds to 212° Fah., then pouring in melted paraffine at this temperature into them, then dipping them into cold water at about 34° in which they are kept for seven minutes. After this they are placed in a chamber containing cool air (varying from 32° to 40°) until they are quite cold, when they are removed in the usual way from the molds, which are of the trip-matrix kind. It is when the paraffine is passing from the liquid to the solid state, that it is liable to become cloudy and full of fissures. The cooling of it quickly in the mold by cold water prevents the cracks and indentations being formed on the surface, and the cooling of it gradually afterwards in the air-chamber renders the candle beautiful and clear in appearance, free from cracks and mottled blemishes. The inventor resides at New Bedford, Mass.

To Examine a Deep Tank or a Well.—It is scarcely possible to see the bottom of a well by looking down in the common manner, but it is perfectly practical to do so with a reflector. When the sun is shining brightly, hold a mirror so that the reflected rays of light will fall into the water. A bright spot will be seen at the bottom, so light as to show the smallest object very plainly. In the same way one can examine the bottom of ponds and rivers, if the water be somewhat clear, and not agitated by winds or rapid motion. If a well or cistern be under cover, or shaded by buildings, so that the sunlight will not fall near the opening, it is only necessary to employ two mirrors, using one to reflect the light to the opening and another to send it down perpendicularly into the water. Light may be thrown fifty or a hundred yards to the precise spot desired, and then reflected downwards.

Oiling Harness Leather.—Oils, when applied to dry leather, invariably injure it, and if to leather containing too much water, the oil cannot enter. Wet the harness over night, cover it with a blanket, and in the morning it will be damp and supple; then apply neatsfoot oil in small quantities, and with so much elbow grease as will insure its disseminating itself throughout the leather. A soft pliant harness is easy to handle, and lasts longer than a neglected one. Never use vegetable oils on leather, and among the animal oils, neatsfoot is the best.