Correspondence.

Gravity Railroad.

MESSRS. EDITORS:—Could not the principle in mechanics, that a round body will roll down an inclined plane, be made available for the transportation of letters and other small parcels from place to place? Let us suppose that two adjacent cities are nearly upon the same level; let two inclined planes be constructed between these cities; these inclined planes to consist of iron tracks—say three feet wide —made of small, smooth iron rails; let hollow balls of suitable size be constructed to run along these rails; fill these balls with whatever you please and give them a great initial velocity, hurling them down a steep descent, and then "let 'er rip." A plane with a descent of a foot or mile would be sufficient, I should think, to maintain, it not increase, the velocity with which the balls would start. This, however, is a question which can only be decided practically by experiment, although any mathematician can easily solve the problem involved in the experiment, namely, "With what power would a given ball descend a given inclined plane?' If these cities are too far apart to be connected by single inclined planes, a series of these planes might be constructed. It the cities are not on the same level, it would, of course, be easy to construct an inclined plane from the upper to the lower city. From the lower to the upper city a greater or less number of planes would have to be constructed, according to the difference of the altitudes of the two cities. There would be no actual necessity for the tracks being perfect inclinedplanes. On the contrary, provided no portion of the track is higher than the standing point, and there is a real descent from the beginning to the end, the track might curve up and down considerably, to suit the exigencies of the country over which it passes. The whole question in a nut shell is simply this:—whether, instead of using power to carry matters from point to point along a horizontal line, it might not be practicable and better to use power and raise that same matter upward, and let it run from point to point along our inclined planes.

W. H. B.

Baltimore, Md., Dec. 8, 1865.

[We believe the great coal company, known as the Delaware and Hudson Canal Company, has a railroad, extending from the head of their canal to their coal mine in Pennsylvania, that is constructed and operated on this principle; but the plan is not a favorite one with civil engineers. Some of the directors of the Western Railroad proposed this method for surmounting the Leicester Summit, and the writer of this ran a line of levels over the summit and drew a profile of the plan, but the scheme was so decidedly opposed by the engineers that the directors were induced to allow it.—EDS.

Foundations.

MESSRS. EDITORS:—In a report made by Professor Bache, of the Smithsonian Institute, recommending League Island, a vast marsh in the Delaware River, as a suitable place for the proposed iron-clad navy yard, he states that a soft soil is the best suited for heavy machinery, as the yielding properties would be less jarring on the ponderous weights that must rest upon it.

A firm in my neighborhood has been at vast expense digging through clay soil, to reach harder material upon which to place stones of the heaviest character, as a foundation for heavy machinery to be used in the manufacture of heavy iron bars and plates, and they stil insist that the foundation could not be too permanent, and that the least yielding in any particular would destroy the machinery. Which theory is to be relied upon?—that of the learned Professor or of the men of practical experience?

A NOVICE.

Reading, Pa., Dec. 8, 1865.

[Experience in forging iron, and in running machinery of any kind, we believe generally leads men to the conclusion that their foundations cannot be too solid.—EDS.

Electro-plating Steel Springs.

MESSRS. EDITORS:—An article copied from the Philadelphia *Inquirer*, on page 336 of the SCIENTIFIC AMERICAN, suggests that a galvanic action is set up in boilers under certain circumstances there named, which tends to weaken the iron. The suggestion is only theory—indeed, hardly that—and, of course entitled to consideration only as like suggestions are. There is a fact, however, that may render this theory worthy of notice among those whose business or pleasure it is to investigate. It is this, a steel spring cannot be electro-plated or gilded without being rendered more or less brittle. If a strain is put upon it while in the process, equaling that of ordinary use, it will frequently break before the operation is completed, and that without being touched, and, if completed with no strain upon it, it is not reliable, and will generally snap, sooner or later, unexpectedly. This fact I have frequently observed, and have not been able to trace it as the effect of preliminary processes of cleansing, etc.

Since writing the above, I am told by an intelligent and experienced electro-plater, that this statement accords with his experience. JOHN SMITH.

Baltimore, Dec. 2, 1865.

[No fact in physical science is more fully established than the formation of an electric current when two metals are brought in contact and subjected to chemical action.—EDS.

Recent Foreign Intelligence.

We find the following letters in the *Mechanics' Magazine*:—

SOFTENING CLAY.

Your last week's number contains a note on the softening of clay for modelers, by means of glycerin —will you allow me to point out to each of your readers to whom it may be of use a cheaper method of effecting the same object? Some year or two ago I had an apparatus at work in my laboratory, parts of which required at intervals to be removed, replaced, and reluted. The mixing of fresh pipe-clay and water every day or each time it was necessary became a bore, so I mixed a quantity once for al', using a solution of chloride of calcium of about 1·350 specific gravity instead of water. I found that I had fully achieved my object, inasmuch as my luting kept good during the whole course of the experiments, and, further, the other day I picked up in a bye corner of the laboratory a piece of this very same luting, as soft, as plastic, and evidently as fit for use as ever. I may add that at the time it struck me that I had read that it was necessary for modelers to keep their clay in a soft state, but I also thought it was necessary that it should be capable of being dried—which wheu mixed with cloride of calcium it would be impossible to do.

PETER HART.

COMPRESSED MOIST HOT-AIR ENGINE FOR MARINE PURPOSES.

On Saturday last, in accordance with the advertisement which appeared in the previous number of the *Mechanics' Magazine*, the trial of a boat propelled by my portable moist-air engine, came off on the Thames, at Lambeth, and I beg to forward you the following particulars:—The boat into which the engine was placed, without any fitting, is 22 feet 6 inches long, by about 5 feet 6 inches beam, and 2 feet deep, and is capable of seating from fifteen to twenty persons. The engine has one cylinder 4 inches diameter and 12-inch stroke, driving a pair of light paddle wheels, 3 feet diameter, about 80 revolutions a minute. The power of the engine is about 1-horse, and the weight of the boiler and engine is about 300 lbs. The maximum speed attained through the water was six miles an hour, but the average speed was five miles an hour. The consumption of fuel in three hours' work was a peck of gas coke which cost (retail) 1½d., coals (4 lbs.) 1d.; total cost for three hours, 2½d. As the boat is capable of carrying 1½ tuns of coal, it would be equal to a voyage of between 3,000 and 4,000 miles, without further fuel. The reason of the extraordinary economy of fuel arises from the use of the latent heat of the steam as a motive power, but which is wasted in all other steam engines. The engine, when not required for the boat, is easily lifted out and may be used either as a light road engine or as a fixed engine of one-horse power, working for less than 1 d. an hour for fuel. Half the fuel and two-thirds the space might be saved in all steam vessels with the same speed or a much higher speed obtained than has been hitherto accomplished.

J. PARKER.

Annual Meeting of Iron and Steel Manufacturers.

The Philadelphia *Press* of December 14th says:—

"The members of the American Iron and Steel Manufacturers' Association of the United States assembled at the Board of Trade room, yesterday morning, for the purpose of holding their second annual meeting. Representatives were present from most of the iron and steel works throughout the Union. In the absence of the President, E. B. Ward, Esq., of Detroit, Michigan, Samuel J. Reeves, Esq., of this city, occupied the chair.

"It is shown by the report of the Secretary *pro tem.* that the product of the blast furnaces in 1864 was 1,149,913 net tuns. Of this, 684,319 tuns were anthracite pigs, 210,108 of raw coal make, and the balance of charcoal make. The products of Pennsylvania and Ohio exceeded one million tuns.

"In 1856, the whole number of charcoal furnaces in the United states was 156. The product of new iron for 1864 was 974,876 tuns.

"The amount of pig iron, scrap-iron, etc., worked up in 1864 was about 1,400,000 tuns. It is evident that this important interest is to be largely developed here in the next few years, and it is the duty of the Government to extend to it every encouragement.

"In 1849 there were 79 charcoal furnaces in Pennsylvania east of the mountains, which produced in that year 55,617 tuns. By the year 1860, 32 of these had finally ceased operations. To the remaining 47, at least 7 new furnaces had been added; the production in that year was 36,576 tuns. In 1864, 42,953 tuns were made. West of the Alleghany Mountains, in Pennsylvania, there has been since 1849 a very marked and rapid decrease in the production of charcoal iron. This region in 1849 produced 55,494 tuns of charcoal iron, 85 furnaces being in operation. In 1884, 9 furnaces only were in blast, producing 8,701 tuns. This remarkable decrease in the quantity of charcoal iron made in Pennsylvania can be ascribed to the operation of several agencies:—

"1. One that has been active for a number of years viz., the absorption of wood for agricultural purposes.

"2. One of recent introduction, viz., the great demand and consequent high price of labor, resulting from the discovery of vast quantities of petroleum in the valleys of the Alleghany and its tributaries.

"3. The extensive introduction of the manufacture of iron from coke and raw coal. These causes, operating with more or less intensity throughout the Eastern States, will probably gradually drive the charcoal iron manufacture into the Western and North-Western States, where wood is cheap and where the ores are of unexampled purity and richness. The total production of charcoal pig iron in the country in 1864 amounts to 255,486 tuns.

"The product of the rolling mills making railroad rails in the United States for 1864 was as follows:—

	Roll Mills.	Total Produced.	Present Capacity.
Massachusetts	2	30,312	37,000
New York	5	57,433	98,000
New Jersey	1	11,687	12,000
Pennsylvania	14	159,610	348,000
Maryland	2	5,488	29,000
West Virginia	2	844	18,000
Ohio	3	20,301	66,000
Kentucky	2	4,441	25,000
Indiana	1	12,773	30,000
Illinois	3	26,880	80,000
Michigan	1	5,600	20,000
Missouri	1	.....	10,000
Tennessee	1	.....	9,000
Georgia	1	.....	9,000
		335,369	792,000

THE superiority of iron over wooden sleepers is manifest on the Madras Railway; all the sleepers on the North-West line are iron, and consequently the cost of maintenance is found to be less than on the South-West line, where the sleepers are of wood. The Company propose to renew half the South-West line with iron sleepers; the other half passes through a district where teak and other timber fit for sleepers are obtainable, so that iron need not there be used.—*Mechanics' Magazine.*