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## STEAM ON THE COMMON ROADS.

A prediction made about ten years since by an eminent civil engineer, that the time was not far distant when the business of railroads would be confined to the transportation of passengers, mails, and costly freight, and that all produce and other heavy or bulky merchandise would be transported by means of steam road wagons over the common roads, or over roads graded especially for the purpose, does not, by the lights of the present times, appear so visionary as it did then. Indeed, it seems quite possible that before another quarter of a century has passed the prediction will be verified so far, at least, as concerns all roads running through the thickly settled parts of the country and to all the feeders of the great trunk lines.

Just previous to the designing of the Union Pacific road the establishment of quicker connection with the Pacific coast by means of steam road wagons, as they are called, was very seriously contemplated, and in fact considerable expense was incurred by the promoters of the project in examination and surveys of the proposed routes, and in constructing an efficient motor.

The plans were carefully investigated and received with favor by competent engineers and men of capital, and would doubtless have been carried into effect in a short time; but at this crisis the necessities of the country demanded the immediate connection of the Atlantic and Pacific seaboards, and the friends of the new and untried project wisely shrank from a hopeless struggle against its well-approved rival.

Of the special motor which was to have been the pioneer in this method of trans-continental transit, and which was then thought to be admirably adapted to the purpose, we have since heard nothing; but inventors and believers in the principle have not in the meanwhile been altogether idle, and both here and in England road locomotives or steam road wagons, of various designs, and adapted to various uses, have been in use for some years, and their numbers are constantly and rapidly increasing.

The public need of some cheap and practical substitute for horses and other animals on highways and farms, and the belief inspired by what had already been accomplished, in the possibilities of the road engine, induced the Legislature of Wisconsin, two years ago, to offer a reward of \$10,000 for one which should do certain work under certain conditions.

Though the most nearly successful of the competing machines cost but \$1,000, and could be run at an expense of from \$2 to \$6 per diem, according to the work performed, weighed but 6,600 pounds loaded with water and coal for an eight miles' run, hauled a wagon and load weighing 3,500 pounds over 201 miles of ordinary country roads at an average rate of 6 miles an hour, and over some parts of the road at the rate of 12 miles an hour—the average speed of our railroad freight trains—and although it was pronounced by the judges to be of unquestionably great advantage in plowing, thrashing, hauling heavy machinery from one farm to another, and for heavy teaming on the highway, it failed to obtain the prize because something in every way superior is looked for. And undoubtedly this something better will be produced under the stimulus of the offered reward.

This action of the Legislature in withholding the reward may be looked upon as a striking example of faith in progress; and however we may judge of it, or however much we may sympathize with the disappointed inventor of this admirable engine, we fully believe that what has been done is proof of much greater possibilities, and that we shall not have long to wait before announcing an engine that will fulfill all the required conditions.

The agricultural and manufacturing industries that are established along our lines of railroad generally demand cheaper land transportation than can ever be afforded by them, and the need of it increases each day with growing competition, while at short distances from railroad lines the added cost of hauling by animals is so severe a tax on farming and manufacturing that such locations, in other respects among the most inviting, are passed by by those who hope to obtain fair remuneration for their labors.

The introduction of this system will of course be most strenuously opposed by the most powerful invested interests of the country, anxious about the millions invested in their freight lines and dreading to lose their grasp upon the riches of the continent; but we have an unwavering belief that the railroad as a freight carrier will a few years hence have to share its business, to a great extent, with the common road wagons.

Even as we write the contractors for carrying the daily mail between Yuma and San Diego are building a steam wagon to transport passengers, baggage, and mail across 100 miles of desert which lies in their route, and they count on traveling at the rate of eight or ten miles an hour on the sandy roads.

## PEOPLE WHO CAN'T BE HELPED.

It is a painful yet inevitable experience of the philanthropically minded, that it is easier to devise plans for the good of the unhappy and unfortunate than to get them to accept the offered blessings. Those who build convenient and sanitary dwellings for the squalid, with a view to lighten the burdens and improve the condition of the shiftless poor, often learn this lesson at no little cost. The force of custom is hard to overcome, and when sustained by prejudice is often irresistible.

A somewhat comical illustration of this sort of fruitless

effort to do good comes from the Laccadives. On those islands the excessive multiplication of palm rats threatened the existence of the inhabitants. Living in the crowns of the cocoanut trees, the rats nibbled off the young nuts, and the fear of starvation and ruin fell upon all the people. They appealed to the Indian Government for aid. The government responded by sending over a stock of cats. But as the cats could get fish to eat below, they declined to climb ninety feet up the trees to get rats. Tree snakes were then tried, but the villagers were prejudiced against reptiles and killed them. Then the government sent out a consignment of mongooses, but the mongooses declined to climb trees after rats while they could get chickens on the ground. With cats and mongooses on the ground refusing to ascend to the rats, the officials decided that all that was required was to make the rats descend to the cats and mongooses, so they sent the islanders over some owls. But they had overlooked the popular prejudice against these birds, and in committee assembled the people decided that even rats up in the trees were better than these "devil birds." They accepted the birds in all apparent gratitude, but as soon as the coast was clear, the owls, cats, and mongooses were all conveyed in procession to a boat and solemnly deported to an uninhabited reef.

## WORKING OF COPPER ORES.

A very noticeable feature of the mining matters of the West is the manner in which our miners treat, or rather neglect, the rich ores of copper which are found in the greatest abundance on every hand, estimating them of value only according to the amount of gold and silver they carry, utterly ignoring or overlooking, in their search for the more precious metals, one which, in many instances, would far better reward the expenditure of labor and capital, if but half the scientific study were devoted to the development of an economical method of working it that is bestowed upon ores of less value.

While it must be admitted that the processes now in vogue are too complicated and expensive to warrant their application to these ores under the present or immediate prospective conditions of the market for copper, it yet is a matter of surprise that no cheaper process has been found. Indeed, we know not of another instance in which the science of metallurgy has been so much at fault—has so signally failed in adapting the cost of production to the merchantable value of the metal.

It is not, perhaps, reasonable to expect that those busied in getting the gold and silver should pay any further attention to the envelope that bears them than is absolutely necessary for the purpose of getting rid of it, unless some very simple process, complementary, it may be, to that by which the precious metals are extracted, shall be designed for the purpose.

Furnaces in which ores are roasted with salt are among the most common appliances in the mining regions, and a "copper process," of which these should form a part, has been suggested to us. The plant would consist of machinery for reducing the ore to a proper fineness, a reverberatory furnace of the style above mentioned (with some simple addition, which will be spoken of further on), lixiviating and precipitating vats, and, finally, a refining furnace for the cement copper.

The smoke stack of the furnace should be furnished with a rose jet, spray wheel, or some other device for wetting down the escaping sulphurous fumes; while under or in close proximity to the furnace must be placed the lixiviating vat, which will contain, at the outset, a strong solution of salt and water, and into which will flow the water which has absorbed the fumes passing up the stack.

The manipulations would be to reduce the ore to the conditions of sand or powder, mix it with salt in proper proportions, and roast it in the furnace, and when the chlorination is effected (no sulphides must remain, but some oxide is not objectionable), to withdraw and throw it hot into the bath of the lixiviating vat.

The chlorides of copper formed in the furnace will be quickly dissolved by the saline solution *per se*, while the sulphurous acid, wetted down and returned to the vat (it should be wetted down with the vat solution), will decompose other portions of the salt and liberate the chlorine to convert the oxide into a soluble chloride. The solution should then be drawn off into the precipitating vats, and the copper precipitated by milk of lime. The refining furnace should then take charge of the precipitate.

It will be observed that there will be left in the precipitating vat a solution of chloride of lime; this may be returned to the lixiviating vat for the reception of the succeeding charge from the furnace (some salt always being added). The sulphurous gases from the stack, which are carried back to this vat, will precipitate the lime as an insoluble sulphate, and liberate the chlorine to act as before.

This is a brief outline of a process which seems to possess the merits of effectiveness, simplicity, and economy, and consequently is well worth the attention of those interested in copper ores.

Though correct in theory and apparently of easy practice, it will undoubtedly fail at the hands of ignorance; but a fair practical knowledge of the chemistry of metallurgy, combined with patience and skill in manipulation, will develop it, we think, into an economical process that will add greatly to the profits of the Western miner of gold and silver, and restore value to the almost numberless copper mines of New England and the Southwestern States.