## Correspondence.

### Railway Improvements Needed.

*To the Editor of the Scientific American:*

The recent terrible railway accident on the line of the C., M. & St. P. Ry. Co., near Rio, Wis., sends a shudder through the entire country, and again, as after each previous disaster of this kind, the question arises, Is there no way to prevent these dangers to which every traveler is liable?

As a step in the direction of greater safety, there are two things which must be accomplished:

1st. Some means must be found to stop trains even more quickly than by the use of air brakes. This can probably be accomplished by an increase of friction, and it is for our inventors to say how this increased friction may be gained. By way of suggestion, I would ask if boxes of sand cannot be placed near each set of wheels; the same to be controlled from the engine. I believe that by means of the air brakes the sliding of the wheels is possible; if not, it might be made so. The presence of sand on the rails would then add materially to the friction.

2d. In order to do away with the horrors of a burning wreck, other methods than those now employed must be found for heating and lighting passenger cars. They might be lighted by the use of electricity, though that is not of so much importance as the matter of heating.

It has been demonstrated only too often that fire cannot be safely carried in passenger coaches, and it is impracticable, in this northern country, to attempt to heat the cars by steam from the engine. There is one method, however, which I think might be employed, viz., the use of soda. It is a well known fact, though of recent discovery, that soda when charged with steam is a source of great heat. Cannot this knowledge be practically applied for heating purposes? I should think that metallic cases of soda might be arranged in a car, and, being charged from the engine, heat the car either by radiation or, perhaps better, by the generation of steam in suitably arranged boilers. In the latter case, the steam, after passing around the car through pipes, could be discharged into the soda, and thus a recharge from the engine be required less frequently.

FRANK HAYES.

Minneapolis, Minn., Nov. 15, 1886.

### Paris Cement.

A new cement, called "cement de Paris," has been introduced in France, the inventor and manufacturer of which is M. Vallin, the director of a French cement works, the Gypserie de la Gare. The new material is stated to be at least equal, if not superior, in quality to the English article, while it can be sold at the rate of 2s. 6d. to 5s. per cwt. This material is said to possess durability and the cold appearance of marble, and a wall rendered, floated, and set with it becomes impermeable to moisture. It can also be polished, and made to present an elegant appearance. In the usual method of manufacturing cement, it is generally found very difficult to obtain a thorough burning of every piece of clay or stone; sometimes the surface of it is burnt too much and the center too little or not at all. The result is that, after the clay or stone is crushed, it contains a considerable quantity of unburnt grains, which play the role of an inert material, and which people pay for as cement. In order to avoid this unequal burning, M. Vallin, instead of crushing the material after, does so before placing it in the kiln. A crushing mill breaks it into small pieces, which are automatically conveyed to a vertical cylinder mill, whence they issue ground to powder. This is in turn again automatically placed on sieves, which shift it into pans or kilns heated by gas. A series of inclined plates, having a gyratory motion, agitate the powder in each of the pans, and thus render every particle of it amenable to the action of heat. Finally, a mechanical arrangement conveys it to sacks, which a man fills as the powder arrives. The whole operation is thus continuous and automatic, which of itself is a great advantage. But still more important and appreciable is the fact that all the particles of the cement are thoroughly burnt. M. Vallin estimates that his method enables him to effect a saving of about 30 per cent over those ordinarily adopted. Besides the homogeneity of the particles, the other advantages claimed for this cement are its great whiteness of color, durability, and freedom from liability to unequal shrinkage, which causes fire cracks.

### The New Water Tunnel, Chicago.

The work on the new lake tunnel at Chicago is progressing rapidly. The men work in three shifts, of eight hours each. The first dig the hole about 10 ft. in diameter, through clay, at the rate of about 18 ft. per day, the second trim it up and wall with planks, and the third lay a circular wall of bricks in cement, 12 in. thick. The tunnel is left a shade over 7 ft. in diameter, the whole plastered with cement. This will be completed in about five weeks, and the whole work in about three months.

### Geologic Distribution of Natural Gas.*

Although natural gas springs are to be found in almost every State in the Union, and in many States gas has been obtained in wells sunk either for water, oil, gas, or as solid mineral prospecting holes, yet the occurrence of natural gas is not dependent upon mere chance, as is popularly supposed, but is, as is now beginning to be recognized by both professional and practical men, a result of special geological phenomena.

The desire among our leading manufacturers to emulate Pittsburg has led to the sinking of many wells in many localities in search of natural gas; some of these wells being located and drilled under the direction of professional experts, but many more being located by persons who are ignorant of the conditions under which gas has already been found, and by "quack" explorers, who often depend upon spiritualistic communications or the divining rod.

The literature on the subject of the geographical occurrence of gas, except in areas contiguous to the Pennsylvania oil regions, is very meager, and scarcely anything has been published on the geology of natural gas except that contained in the reports of the Pennsylvania Survey, of which Mr. Carll has been the leading author. In considering the geologic distribution of gas in the United States, I have not sufficient facts at present in my possession to make a paper on the subject complete or exhaustive.

The practical application of natural gas, in various forms, in Western Pennsylvania has opened up a new era in fuel economy and the development of heat and mechanical power, and it becomes a practical necessity for every community where there is the slightest possibility of finding natural gas to make a thorough and intelligent exploration for it; and for all other communities, in which, from the geological conditions of the underground structure of their region, it is impossible for the rocks to contain gas in commercial quantities, to plan to manufacture a fuel gas. There is no doubt in my mind but that the greatest advance to be made in the practical arts and sciences during the next two decades is to result from a practical consideration of the question of the manufacture and utilization of gaseous fuels, and the adaptation of plant and machinery to the new fuel relations that I believe we are bound for economy's sake to establish.

It is difficult to prescribe any fixed limits in the geological scale to the occurrence of natural gas and petroleum. Every known rock, with the exception of the eruptive rocks, is known to contain the remains of organic matter (vegetable and animal); and since the leading geologists agree in the opinion that both oil and gas result from the decomposition of organic remains, it is quite possible to find gas and oil in rocks of any geological age—in some rocks in commercial quantities, and in other rocks in quantities so small as to be only of scientific interest to the geologist and mineralogist.

Next to the necessity of having a sedimentary rock in which animal or vegetable remains of past geological ages have been buried, the presence of gas is dependent upon the existence of a porous or cavernous rock, to serve as a reservoir to hold the gas, and an overlying impervious rock roof to confine the gas. The other necessary conditions for the occurrence of gas are more dependent upon the forces to which the strata have been subjected, and the resulting geological structure, than upon the age of the rocks themselves.

The tendency among practical oil and gas well drillers and operators to discover, in a new district where a well may be drilled, the same section of rocks as is found in an old district makes it important that both drillers and operators should realize the fact, as proved by geological investigation, that no two wells can be put down, distant from one another but five miles, more or less, where the same section of rocks may be found in both wells.

All the oil and gas horizons in Pennsylvania are located in sandstones and shales, from the Portage up to and including the Coal Measures. In Ohio, the oil and gas horizons are included in the Paleozoic strata from the Upper Coal Measures down into the Trenton Limestone. In New York, where natural gas is more generally distributed, as indicated by gas springs, than in either Pennsylvania or Ohio, but where much less has been found in commercial quantities, the gas horizons are found in the formations from the Chemung down to the Hudson River Shales, inclusive, with the possibility that some may be found in the Trenton Limestone.

On account of the intimate connection existing between oil and gas, it is reasonable to suspect the existence of natural gas in all sandstones producing oil.

The amount of gas that is at present flowing from the explored sands in Pennsylvania is probably two or three times greater than is required to meet all present demands. With an appreciation of this fact, and of the possibility of extending the gas pools and developing new ones, very little alarm should be entertained as to the exhaustion of the gas sands of Pennsylvania and the prostration of the manufacturing interests that become dependent upon its use. It becomes, however, a question of vital importance to the commonwealth of Pennsylvania, and to every citizen interested in the industrial concerns of the State, that the extravagant waste of gas that is now going on everywhere throughout the oil and gas region should be stopped. The action of the Philadelphia Company, which is now one of the largest natural gas companies in Pennsylvania, in shutting in the wells all the surplus gas that is not needed, should be emulated by every individual who has pecuniary interests in gas wells; and it is a question that should be settled by our State Legislature, by compelling all gas well drillers and operators to shut in the gas that is not needed.

The discovery of natural gas in Ohio is the dawn of a most important era to the manufacturing and industrial interests of that State. This statement is worthy of special reference here. Any comparison as to the amount of gas that Pennsylvania and Ohio respectively will be able to produce in the future would be invidious, and in fact we have not sufficient evidence upon which to base any reliable conclusion. That there is sufficient gas in Ohio, as well as in Pennsylvania, to meet the demands of manufacturers for a number of years, and sufficient in many localities to warrant the erection of new plants, there is no doubt; but still it is well to bear in mind that our gas supply is exhaustible, and that in the main all the gas that we can hope to obtain in the future now exists in a gaseous form confined in our rock reservoirs. When these reservoirs are emptied, our supply will have ceased.

* Abstract from the *Engineering and Mining Journal* of a paper read at the St. Louis Meeting of the American Institute of Mining Engineers, last October, by Charles A. Ashburner, Geologist in charge Pennsylvania Survey.

## DECISIONS RELATING TO PATENTS.

**U. S. Circuit Court.—Northern District of Illinois.**

POPE MANUFACTURING COMPANY *v.* OWSLEY. OWSLEY *v.* POPE MANUFACTURING COMPANY.

INTERPRETATION OF LICENSES.

Blodgett, J.

Equity has jurisdiction to compel a discovery of the number of patented articles made under a license, where the licensee neglects or refuses to make monthly reports as he has covenanted to do, and a covenant to make a monthly report is, in fact, a covenant for a monthly discovery of the work done under the license.

Where a license does not purport to give an unlimited right to the use of the patent, but restricts the right to machines of certain descriptions, when licensee makes machines not in conformity to his license, but within the patent, he not only violates his express covenant not to do so, but violates the patents.

A license provided that licenser may terminate it by notice in writing. He sent a postal card to licensees, reading: "Your royalty return for February has not come to hand. Failure to forward same within five days from March 10 subjects your license to revokement." *Held*, that this paper fell far short of a notice in writing of a revocation or termination of the license.

Licensees under patents covenanted that they would not dispute or contest the validity of the same or of complainant's title thereto. *Held*, that as long as the licenses remain in force defendants are estopped by the terms of their agreements from denying the validity of the patents in question.

The mere fact that the owner of a patent alleges an infringement, and threatens suit unless a settlement is made with him, cannot be held to make such settlement void for fraud or intimidation.

The fact that defendants feared the result upon their business of a suit for infringement of patents, and therefore settled and took a license, is no support to a charge of fraud in the procurement of the license.

Where a license was granted covering a large number of patents, including one which had already expired, but which licenser owned and licensee had infringed, and there was no proof that it was included by the licenser in bad faith, *held* not enough to taint the transaction as fraudulent.

The date or duration of a patent is a matter of public record, of which a licensee is as much bound to take notice as the licenser.

A license under patents is not affected by the fact that in a suit between other parties the patents have been adjudged void where the licensee has agreed not to contest their validity.

Where licensee under a patent agrees not to contest its validity nor licenser's title, he cannot urge want of patentability nor any question save that whether his devices are covered by it.

Where the alternative to settle a claim for infringement or litigate is fairly tendered to a party and he chooses to settle, he cannot afterward retreat from the settlement merely because some other party has successfully contested the validity of the patents.

Where a license included a large number of patents, and provided that licensees should pay a stipulated royalty on all machines made by them "embodying in their construction or mode of operation the inventions and improvements shown and described in each, all, or either of said letters patent," *held* that so long as licensees used either of the patents they were liable to pay the royalty named in the license.