Correspondence.

Fire from Steam Pipes.

To the Editor of the Scientific American:

On page 17 of the SCIENTIFIC AMERICAN, dated January 9th, 1886, is an article on the subject of fires caused by steam pipes. Will you please explain, through the medium of your valued paper, what it is that prevents the wooden lagging of locomotive boilers from firing? If the article is correct, a very few hours' exposure to the heat, due to the high steam pressure usually carried on these boilers (120 to 140 pounds per square inch), should cause it to char and ignite; while the fact remains that the wood stands for years, and, under normal conditions, never chars nor ignites. In fact, there are only two causes which can make it ignite: First, the sheet iron jacket sometimes gets loosened, and allows sparks from the smoke stack to get under and set fire to it. Second, if the water in the boiler gets low and the crown sheet becomes exposed, thus superheating the steam, the wood may char or possibly ignite. I have known sawdust and shavings to lie on top of a boiler for years, and never knew them to char or burn—the boiler meantime working at from 60 to 100 pounds pressure. In fact, you will find it impossible to set wood on fire with steam pipes working at any reasonable pressure, unless you use superheated steam.

E. P. CLARK.

Owego, Tioga County, N. Y., January 12, 1886.

A Case of Spontaneous Combustion.

To the Editor of the Scientific American:

In the SCIENTIFIC AMERICAN recently a good deal has been said about spontaneous combustion, and wood being first charred and then ignited by close contact with steam pipes. Permit me to state what occurred in my presence, some twenty years ago.

I was running a stationary engine of 25 horse power, steam being supplied from two cylinder boilers 28 feet long, through a copper pipe about 9 feet long. The engine was one of the old type, without piston springs; the rings being kept out by hemp packing being driven tight in between the piston head or spider and the packing rings. This packing required to be renewed frequently, perhaps once a month.

One day in the forenoon, the engine was working badly, the packing having got too loose. I told the fireman to let the steam go down at dinner hour, and while the hands were eating, I would pack the piston. When the whistle blew, I at once took off the cylinder head. I then unscrewed the bolts in the piston head (this was pretty hot work, as I hadn't given the piston time to cool, and there was a little damp steam leaking through the valves into the cylinder). As soon as I got the screws out, I pulled off the piston head. Immediately the air struck the old packing, it commenced burning, and in a minute or so it was all a mass of red fire.

The highest pressure of steam at any time on the boilers was 60 pounds, but the usual working pressure was 50 pounds to the inch.

When a fiber of hemp exposed to a pressure of only 50 pounds, for not over four weeks, of *wet steam* ignites as suddenly as this did, on getting access to the atmosphere, I think it can be safely concluded that many of our fires unaccounted for had their origin from close contiguity of *dry* steam pipes and wood.

If there is anything of value in this fact, you are at liberty to use it as you deem best for public safety.

J. R. MABERS.

Lynchburg, Va., Jan. 16, 1886.

The Natural Dissemination of Gold.

BY PATTERSON DU BOIS.

It is now nearly a quarter of a century since the people of Philadelphia were startled by the report that the bricks of their houses, as well as the clay beneath their streets, contained an appreciable proportion of gold. The revelation emanated from the Assay Office of the Mint; and the same authority that announced to every landowner his proprietorship in the treasure trove denied to him the means of extracting the wealth which nature, with such even-handed justice, had distributed through her wide domain.

In June, 1861, the then assistant assayer, Mr. William E. Du Bois, read before the American Philosophical Society a paper "On the Natural Dissemination of Gold," briefly setting forth the results of a series of investigations conducted by Mr. Jacob R. Eckfeldt, the assayer of the mint. These formed the basis of some curious propositions and calculations, which the author so interestingly presented as to lead to the republication of the pamphlet in England, as well as to countless abstracts by the daily press of our own country. Since then, there have been tidal waves of inquiry, and piecemeal expositions of the subject, the newspapers far and wide catching it up, copying and recopying from one another, diminishing truth and multiplying error, until it would seem that the time has now arrived for a fresh start in an authorized republication. While not strictly *apropos* of numismatics, there are reasons why this account of a treasure trove may not be altogether out of place, and certainly not void of interest to the readers of the *American Journal of Numismatics*. I therefore reprint the main portion of the original report, as follows:

"To assert that gold is at once a very rare and a very abundant metal would seem to be an abuse of language; and yet, in a certain sense, it would be true in both branches of the proposition. Iron, in its many mineralized forms, has been profusely scattered by the Creative Hand all over the world; and gold is found in so many natural situations and alliances where it would not be looked for, as to hold out the expectation that a diligent search would find it almost as widely, though by no means so plentifully, diffused. Such is not the fact in regard to many other metals, but it is remarkably true of the two which stand in the market at the head and foot of the list.

"These remarks are preliminary to the detail of several interesting examinations lately made by Mr. Eckfeldt, the principal assayer of the mint, from time to time, as opportunities of leisure would allow.

"The first experiments were made upon galena, or native sulphide of lead. It was well known that this was occasionally found to contain gold in larger or smaller proportions, according to the various localities. But inasmuch as there is reason to believe that every variety of galena is argentiferous, it seemed an interesting inquiry whether *gold*, as well as silver, is sure to be found in the same association. Our examinations have gone far enough to warrant the belief that such is the case. . . .

"We find in the galena of Ulster County, New York (Ellenville locality), gold to the amount of 17½ grains, or 75 cents, to the ton.

"The most curious result was obtained from the galena of New Britain, in Bucks County, Pennsylvania, where gold was found in the proportion of 2¼ grains, not quite ten cents, to the ton. This represents one part in 6,220,000, and may serve as a remarkable example of refinement in the art of assaying. The operation was performed on five ounces of the ore. The speck of gold which resulted is visible to a good eye, and is exhibited in the cabinet of the mint.

"Turning next to the examination of lead in its metallic and commercial shape, we find the Spanish bar lead, which is sufficiently free from precious metals to be used as an agent in our mint assays, contains 12 grains of gold to the ton, or one part in about 1,170,000.

"The next inquiry was, whether other metals, especially those which are commonly considered to be naturally unaccompanied with gold, were absolutely so.

"Copper was tried in various forms. A cent of 1822, the material for which was imported from England, showed gold equal to one part in 14,500, which is one cent's worth in twenty cents. An English halfpenny showed a like trace of gold. A cent of 1843, of American material, was found to contain one cent's worth of gold in fourteen cents. The result brings to mind the old story of the golden cent of 1814. In that year, as was idly reported, the melters at the mint carelessly emptied some gold into a pot of copper from which the cents were coined. It gave some trouble at the counter of the mint for many years afterward, in consequence of numerous inquiries and offers to sell. It turns out to be pretty certain that every cent we have coined contains gold, effectually locked in.

"Lake Superior copper is perhaps as free from gold as any, yet is not absolutely so. A trial of 30 grammes showed a quantity not sufficient to affect sensibly a delicate assay balance.

"Adverting to other metals, it is well known that silver is never found in nature quite free from gold.

. . . . . .

"A specimen of metallic antimony was found to contain gold, one part in 440,000. In bismuth the gold amounted to one part in 400,000. A specimen of zinc proved to be absolutely free from gold, a result which may relieve some minds of the suspicion that the very atmosphere of the mint imparts gold to everything within its walls, or that there was a want of the utmost care in the use of vessels and reagents in these operations.

"Perhaps the most curious result of all is that which remains to be stated.

"Underneath the paved city of Philadelphia there lies a deposit of clay, whose area, by a probable estimate, would measure over three miles square, enabling us to figure out the convenient sum of ten square miles.* The average depth is believed to be not less than fifteen feet. The inquiry was started whether gold was diffused in this earthy bed. From a central locality, which might afford a fair assay for the whole, the cellar of the new market house in Market Street, near Eleventh Street, we dug out some of the clay, at a depth of fourteen feet, where it could not have been an artificial deposit. The weight of 130 grammes was dried and duly treated, and yielded one-eighth of a milligramme of gold, a very decided quantity on a fine assay balance.

"It was afterward ascertained that the clay in its natural moisture loses about fifteen per cent by drying. So that, as it lies in the ground, the clay contains one part gold in 1,224,000.

"This experiment was repeated upon clay taken from a brickyard in the suburbs of the city, with nearly the same result.

"In order to calculate with some accuracy the value of this body of wealth, we cut out blocks of the clay, and found that on an average a cubic foot, as it lies in the ground, weighs 120 pounds, as near as may be, making the specific gravity 1·92. The assay gives seven-tenths of a grain, say three cents' worth of gold to the cubic foot. Assuming the data already given, we get 4,180 millions of cubic feet of clay under our streets and houses, in which securely lies 126 millions of dollars. And if, as is pretty certain, the corporate limits of the city would afford eight times this bulk of clay, we have more gold than has yet been brought, according to the statistics, from California and Australia.

"It is also apparent that every time a cart load of clay is hauled out of a cellar enough gold goes with it to pay for the carting. And if the bricks which front our houses could have brought to their surface in the form of gold leaf the amount of gold which they contain, we should have the glittering show of two square inches on every brick.

"We have inquired but little into the researches of other experimenters in this line. Some years ago it was stated that Mr. Lennig's workmen had washed out gold from the sands of the River Delaware, and a French writer affirms that there is a trace of gold in the sands of the Rhine.

"When we consider the uses to which this noble metal is providentially adapted and wisely applied, we cannot but wonder at the apparent waste or misplacement by which so much is irrecoverably lost, and to all appearance had as well not been made. Perhaps such inscrutable mysteries in the realm of nature may help us to submit to other difficulties in other parts of the divine order and government. Of this we may be confident—that the atoms of gold are homogeneously and equally disposed through the clay or other matrix; but by what natural process, and for what final cause, these fine particles should be thus diffused, seems quite beyond the reach of human philosophy.

"The paper thus offered, however deficient and practically unimportant, may afford a diversion of mind, for the moment, from the one idea of the times upon which we have fallen."

In one sense the facts and figures may be regarded, at least by the unscientific, as "practically unimportant." But after all, there is another practicality, of the moral sort, suggested by the author's concluding reflections. If these "inscrutable mysteries in the realm of nature" *do* help us to "submit to other difficulties," their end is quite practical; and the marvelous attenuation that deprives the gold of all its value to the political economist accords it a new and higher value in the better economy of the moral and spiritual life of man.

It remains only to add, that all the subsequent experience of these two assayers, as well as of those who succeed them, confirms these remarkable conclusions upon the natural dissemination of gold.

* It must be borne in mind that these figures apply to the Philadelphia of twenty-five years ago. It is hardly necessary to remind the reader that they would be much amplified now.—P. Du B.

The Waring Anti-induction Cable.

The Waring anti-induction cables are manufactured in many forms to suit a variety of uses, and may contain any required number of conductors; but whatever the form, the general principle of construction is substantially the same in all. The conductor is first enveloped in a wrapping of fibrous or textile material, which is then saturated and coated with an insulating compound, to which the name "ozite" has been given, and the whole is afterward inclosed in a continuous sheathing of lead, which is pressed closely around the insulated conductors, each conductor being separately surrounded by the metal on all sides. This metallic sheath serves to perfectly screen each conductor from all induced currents from adjacent parallel conductors, making it the only absolutely anti-induction cable, and the only cable in which telegraph, telephone, and electric light circuits may be worked side by side without interfering the one with the other. The disastrous effect of induction on telephone circuits is so well known that no elaboration is needed. In the Waring anti-induction cable the inductive action from wire to wire is, of course, effectually cut off by the intervening shield of metal, a feature which renders the cable peculiarly well adapted for the telephone service. But not only does the construction of this cable prevent interference from induction in the cable conductors themselves, but also where air lines are connected to even a short length of the cable the latter is found to eliminate induction.

No underground cable that does not embody this anti-induction feature is adapted for a general underground system, in which telegraph, telephone, and other electric circuits may be worked in the same cable.