## Correspondence.

*The Editors are not responsible for the opinions expressed by their Correspondents.*

### The Westfield Explosion.---How they use Steam on the Mississippi.

*To the Editor of the Scientific American:*

Although somewhat late to communicate with you upon this subject, I wish to express my surprise that such a conclusion should have been arrived at by the coroner and his jury, as to have caused the President of the line and engineer of the boat to have been arrested as the parties responsible for the disaster.

The Government, in view of the ignorance, of steamboat engineers and the public generally, of the strength of boiler materials to withstand stationary and vibrating pressures, attempted to regulate matters by prescribing that hydrostatic tests and examinations be made by certain inspectors of more or less ability, and that the persons given charge of steamboat boilers be examined and licensed. In order to make assurance doubly sure, a system of compound levers, called a lock up safety valve, has of late years been required to be bolted to each boiler, as a sort of cast iron substitute for brains.

Now here is a boiler that is supposed to have passed the required test, and has cast iron brains furnished to it to prevent the pressure from exceeding the lawful amount, and the engineer duly licensed, and in spite of all this, it blows up and kills a good many people. Now, who is responsible? is what many wise men have been consulted for the purpose of ascertaining. Clearly, the Government, and no one else. The inspector takes all responsibility from the owners, and he, acting in accordance with the printed laws and instructions, shifts the responsibility to the makers of those instructions and laws, whose name is the same as that of the devils in the herd of swine, Legion—rather too many to shut up in the Tombs.

The whole system then is at fault; instead of requiring that all parts of boilers should be built to sustain six times their working pressure, or three times their tested pressure, they are usually tested up as high as they will bear for an instant, and the pressure instantly relieved; the working pressure is then certified to be two thirds the highest point reached by the index of the pressure gage. No wonder that boiler makers say that cold water tests are bad for boilers.

The evils of the present system were brought very clearly to my mind recently, when I had business in the West, requiring me to tempt Providence by traveling on a Mississippi river steamboat, The boat had four cylindric boilers forty inches diameter and twenty-six feet long, each having two flues fourteen inches diameter. The boilers had been tested at 188 pounds, and the limit of steam pressure was $125\frac{1}{3}$ pounds. They were of one quarter inch iron, single riveted. Getting sight of the steam gage, I found it showing 160 pounds, but I was much pleased when the engineer informed me that it was twenty pounds out of the way, and the real pressure was only 140. One of those shapeless traps called a lock up safety valve was attached, which was so effectually locked up that no steam could issue from it. The other valve was raised by hand when required, which was rarely, as the blow through valve was mostly relied upon when the boat was stopped. I found upon inquiry that the inspector's rule for testing boilers paid no regard to the strength of the flue (although Fairbairn's experiments were published many years since), but were based entirely upon the diameter and thickness of the shell, with a strength (assumed) of 60,000 pounds per square inch in tension. At my first opportunity, I made the following figures: $60,000 \div 2 \div 2 \div 40 = 375 =$ bursting pressure of fore and aft seam; and for the flue, applied the formula in Haswell's book $\frac{\frac{1}{4}^2 \times 93,000}{26 \times 14} = 187$ pounds pressure required to collapse the flue. Here then were these flues, that had been tested up to and beyond their calculated strength, and perhaps flattened in the operation, so they were ready to go at almost any time when the engineer should neglect to open his blow through valves. Should this article cause people to speculate more upon practical probabilities regarding boiler explosions, and learn that all boilers have a limit of strength that should not be exceeded, we may hope to see steam vessels made safe. H.

St. Louis, Mo.

### Telegraphic Instrument for Learners.

*To the Editor of the Scientific American:*

In your paper of July 29th, in "Answers to Correspondents," I promised H. L. C. (who wanted to know how to construct an electrical engine) and T. G. B. (who wished directions for constructing instruments for learning telegraphy) that I would send them specifications and drawings gratis.

This I was prepared to do, but in addition to their letters I have received a score or more from other persons from nearly every State in the Union, and from Canada. I cannot write and send drawings to each separately, and as there seems to be so much interest manifested, I know of no better plan than to ask you to publish, for the benefit of all, a few remarks which I hope will be satisfactory.

As only H. L. C. has written about the electrical engine, and as I have answered him explicitly and fully, I will confine myself to the means of learning telegraphy without a battery or electromagnet.

It will save much time and space to simply state that the instrument which I propose is a slight modification of the Morse "register." I presume every one can obtain a sight of one of them. The modification is simply the removal of the electromagnet, and the addition of a "button" to the outer end of the pen lever, whereby it (the pen lever) is converted into a "key," and all manipulations thereof will be shown on the ribbon of paper as it passes between the rollers. In some registers both the down and back strokes are regulated by double nuts on the post at the outer extremity of the pen lever, but as this arrangement would interfere with the working of the key, two posts (adjustable) should be used; one at the outer end, to receive the down stroke and regulate the depth of the impression in the paper, and the other near the inner end to receive the back stroke and regulate the amount of motion.

Your readers will understand that this arrangement does not contemplate the transmission of signals to any distance, but simply a register of the manipulations of the learner, who will be able to correct errors which he would not recognize were he learning by sound. Two persons sitting at such an instrument can transmit messages to each other without having the disagreeable task of keeping a battery in working order; and after considerable practice the letters will be as readily distinguished by sound as by sight. I maintain that by the use of paper in learning, the learner acquires more exactness in the length of dots, dashes, and spaces than he otherwise would, and that if all the operators now employed had thus learned, very few if any of the egregious blunders constantly occurring would be made. The tailor's dying advice was "Always tie a knot in the end of your thread," and my advice to learners of telegraphy is, always space your letters and words as accurately as a good printer does Practice your letters j and k until the former is different from nn and the latter different from nt or ta. Give the dashes their full length, and shorten the dots as much as you choose, but above all space between your letters and words.

In regard to the learner being able to make his own instrument, if he is ingenious, skillful, and has the tools and material at hand, he can do so; but I would think it best to apply to some manufacturing electrician who, by the above description, could make exactly the right thing and furnish a roll of paper with it for about $20.

To those who prefer making their own, I would point out some difficulties and necessities, to wit; the pen lever must be hung so that the pen will accurately fit into the groove of the roller, and have not the slightest lateral motion. The rollers must be held together by springs or weights just sufficiently to firmly hold and draw the paper. Such an arrangement will allow the passage of irregularities, or a "splice" in the paper. The posts must be adjustable, by a perpendicular screw and check nut in their tops. If these conditions be complied wi h, the train of gearing working smoothly, no one will have any difficulty after a little experience in the working of the machine. M. L. BAXTER.

Aurora, Ill.

### Brick Burning.

*To the Editor of the Scientific American:*

The answer to queries of D. H. S., Jr., August 26th, page 138, depends largely upon the method employed by him, whether he adopts the old fashioned way of building fires underneath and burning from below upwards, or resorts to a modern improvement where the fires are built in a separate furnace entirely outside the kiln proper, and where the products of combustion are carried into the top of a close room, while exhaustion is effected from the bottom, burning from above downwards, thus avoiding "benches" altogether, and improving the uniform quality of his stock.

Another important new feature is the construction of kilns so as to enable one to utilize the surplus heat remaining in the glowing mass of a newly burned chamber, by conducting it into an adjoining compartment filled with green material, instead of wasting it, as is done by the old method.

In the old fashioned way of burning, benches, of course, are unavoidable, and experience shows that three benches give better results than two, and where the clay (mud) is charged with coal dust, four benches are preferable.

The old way of burning takes about four cords of good hard wood to twenty-five thousand, that is, when coal dust is mixed with the clay, and about double that quantity when the coal dust is not used. Pine or other soft wood will not go so far.

On the North river, where the great bulk of our common brick for the New York market is made, coal dust is used almost universally, and the average expense for fuel (wood) slightly exceeds one dollar per thousand.

In Philadelphia and elsewhere, where a better grade of bricks is made and coal dust not used, the cost of fuel varies from $1.40 to $2 per thousand.

Bricks can "be well burned with the soft and sulphurous bituminous coal of Iowa and Illinois," or with any other combustible material, provided you avail yourself of the improvements recently made in this field.

The exact amount of coal required per thousand will depend very much upon the nature of the clay used, its manipulation, and also upon the method adopted in burning, whether you burn from below upwards in an open kiln, or from above downwards in a close kiln, and whether you utilize properly your surplus heat. A. R. MORGAN.

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### Canal Navigation.

*To the Editor of the Scientific American:*

As the articles in your paper, as far as they have come under my observation, in reference to canal propulsion, are based apparently on theory only, I can no longer forbear attempting to say something. The idea of producing an invention to propel more advantageously our present form of canal boats than by horses, is theoretical in the extreme, simply because the boats are adapted only for horse power. But why not use steam? Are there not boats already floating in every part of the habitable globe propelled by steam? If so, why not on canals? Some of the reasons, in my judgment, are as follows:

First, the boats now in use are not of the proper form. They must have a sharp bow, to prevent side swells. Mr. Hermanee's idea of a screw propeller is correct to a certain extent, but his adjustable bow would be impracticable. Mr. A. S. Ellis's iron tug is equally impracticable. How can his tug form a bow to the vessel, unless the propeller be in front? And if it be, will not the water, forced from the propeller, strike against the tug and retard its motion, and also divide the swell and send it against each bank of the canal? Will it not be troublesome in getting it through the locks, etc., in detaching the ropes and fixtures for fastening the tug to the boat? Will it not take time? Is not time money?

Second, the boats must have more than one propeller to prevent side swells. Construct your boats with a sharp bow. Place a small screw propeller on each side near the stem, and one immediately behind, which can very easily be done; then you will have a plan that is practicable. But, you say. "'it will cost more;" so it will; and "take more power to drive it;" true, it will, a little. But how can this be helped? Is a common cart suitable for a stage, omnibus, or gentleman's carriage? Will not the boat and machinery have to be adapted to what it is intended to do? Another may say, will not three propellers to produce the same power make a greater swell than only one? No. Will three waves upon the ocean, ten feet high, produce a greater surf upon the shore than one thirty feet? or will three waves three inches high injure the canal banks more than one nine inches? I think not.

Weissport, Pa. S. HAGAMAN.

### The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections during the month of July, 1871.

There were 868 visits of inspection made during the month, by which 1778 boilers were examined—1489 externally, and 619 internally,—while 176 were tested by hydraulic pressure. The number of defects in all discovered was 665, of which 121 were regarded as dangerous. These defects in detail were as follows:

Furnaces out of shape, 33—6 dangerous; fractures in all, 40—19 dangerous; burned plates, 50—16 dangerous; blistered plates, 66—10 dangerous; cases of sediment and scale, 107—14 dangerous; incrustation, 116—14 dangerous; external corrosion, 34—8 dangerous; internal corrosion, 25—1 dangerous; cases internal grooving, 5; water gages out of order, 46—3 dangerous; blow out apparatus out of order, 5; safety valve overloaded, 18—6 dangerous; pressure gages out of order, 93—9 dangerous; boilers without gages, 4; cases of deficiency of water, 5—5 dangerous; broken braces and stays, 16—9 dangerous; boilers condemned as unsafe and beyond repair, 8.

In view of the defects which are revealed by the careful inspection of boilers, both internally and externally, we see no reason why boiler explosions should be attributed to "mysterious agencies." We must learn that boilers grow weak and deteriorate by use and age, and when this deterioration is hastened by poor setting, unreliable attachments, and bad management, is it any wonder that boilers explode? The work of corrosion is insidious, and its effect very dangerous. We have in this office a piece of iron less than $\frac{1}{30}$ of an inch thick, and the day before it was discovered, 80 pounds pressure to the square inch was used on the boiler from which it was taken. The boiler had been subjected to hydraulic pressure, and stood a test in excess of the stipulated pressure, but a slight blow of the hammer broke the iron entirely through. Inspection to be effective must be searching. It must be external and internal, if possible, including attachments, feed, and blow apparatus, setting, and management of boiler. When careful examination reveals none of the defects enumerated above, we may look for comparative exemption from boiler explosions. If a boiler is weak in any particular spot, that spot will be more sensitive and affected by undue or over strain, than any other portion of the boiler, and this weakening process will go on to actual rupture, if not discovered and strengthened in season. When a boiler is under steam, with no outlets, a vast quantity of heat is stored up in the water, only waiting to assert its power when opportunity is presented. Steam is generated in a boiler from the fire surface and rises from the pressure of the cooler water above. This evolution of steam goes on until the pressure accumulated in the steam space over the water is so great that no more steam is evolved. This condition is called an equilibrium between temperature and pressure, but so long as the fires are kept up the water is storing up heat. Now suppose a sudden rupture releases this pressure in part, the potential energy stored up in the water immediately flashes into actual power, and the shock is sufficient to rend the strongest materials. If we consider heat as the source of power, and that the action of heat on matter is always attended by the production of power, we shall be enabled to form a tolerable idea of the force concealed in a large body of highly heated water.

HOME MADE CANDLES.—Many of our readers in the rural districts will find that candles can be made economically, by mixing a little melted beeswax with the tallow to give durability to the candle, and to prevent its "running." The light from a tallow candle can be improved in clearness and brilliancy by using small wicks which have been dipped in spirit of turpentine and thoroughly dried.

THOSE who use a plain, unstimulating diet, have little thirst.