

## BAYLEY'S RAILROAD JOINT AND SPIKE.

The invention which we here illustrate is worthy the attention of engineers and superintendents of railroads; it comprises a new form for the rail, a new device for securing the joints, and an improved spike head.

The form of the rail is that which would be produced by splitting the common T-rail vertically in the middle, reversing the outside half, and placing the two pieces together; this forms a symmetrical rail with a narrow thick lip, *a*, at the top on the inside, and a broad thin lip, *b*, on the outside, furnishing a firm table for the wheel, and with a narrow thick lip, *c*, at the bottom on the outside, and a wide thin lip, *d*, on the inside, making a broad base for the rail. This rail, having the same form at top and bottom, is reversible, so that when the top becomes worn too much for use, it may be turned over and used as long with the opposite edge uppermost.

For fastening the ends of the rails together, the plate, *A*, is fashioned to fit the outside of the rails, and is bolted to them as shown in Fig. 1, the holes for the bolts being elongated to permit the expansions and contractions of the rails. To prevent the nuts on the bolts from turning, the blocks, *B* and *C*, are placed snugly under them and secured by the spikes, *e* and *g*. The spike head is made of the solid and strong form shown in Fig. 2 and is provided with a hooked projection by which it may be drawn from the tie by means of a crowbar without injury.

This invention is protected by two patents, secured through the Scientific American Patent Agency; one dated Nov. 1, 1859, and the other Dec. 3, 1859, and persons desiring further information in relation to it will address the inventor, G. W. R. Bayley, at Brashear, La. Patents have also been secured in England for this invention.

## OUR STEAM FIRE ENGINES.

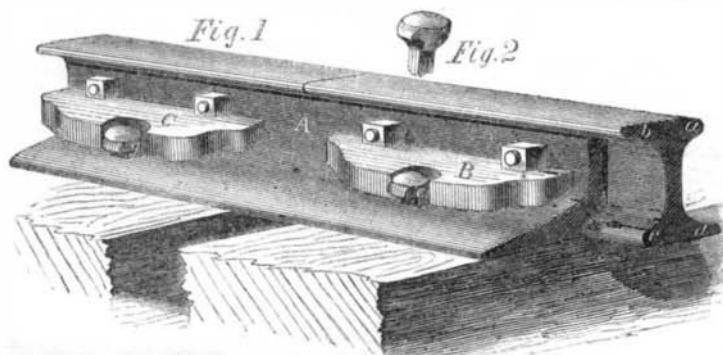
A large fire occurred in Beckman-street, this city, on the morning of Thursday, Dec. 29th, by which the paper warehouse of Cyrus W. Field and several other buildings were entirely consumed. At this conflagration two new steam fire engines exhibited their superiority as fire-extinguishers in a most gratifying manner. The *Manhattan*—(belonging to Engine Co., No. 8,) drawn by hand, and weighing only 5000 lbs.—threw two streams of  $1\frac{1}{4}$  inch each, being about 500 gallons per minute; and the *Niagara*—a self-propeller—threw two streams of  $1\frac{1}{2}$  inch each, being about 700 gallons per minute. One of these engines commenced working at 5 A. M., and the other at 6 A. M.; and they never ceased pumping until the fire was completely subdued; being kept constantly working, for nearly ten hours. The firemen who were engaged on the hand engines at the fire were soon exhausted as the day was bitterly cold; but the steam machine never gets tired. These engines were built by Lee & Larned, of this city, and are each provided with Cary's rotary pump. It affords us pleasure to see these agencies adopted by our heroic firemen.

During the time the fire was raging, the Mayor of Philadelphia kindly telegraphed to the Mayor of New-York, that, if help were wanted, two steam fire engines were ready to start to assist in extinguishing the conflagration. The value of loss sustained is estimated at \$500,000; it would have been double this amount, it is believed, but for the steam engines.

## DOES A RED-HOT STOVE BURN THE AIR?

There is a very common notion that if stoves or furnaces are heated red-hot, the iron will combine with the oxygen of the air, in other words burn it, and render it unfit for breathing. If we examine the facts we find that this idea is true to so small an extent as to make it of no practical importance. The compound which is formed by burning iron in atmospheric air is principally the black oxide, which consists of three equivalents of iron and four of oxygen, ( $\text{Fe}_3\text{O}_4$ ) that is, 22 lbs. of iron to 32 lbs. of oxygen. Consequently, it will require

32 lbs of oxygen to entirely consume a stove weighing 82 lbs. Now 100 cubic feet of air weighs about 122 ounces avoirdupois, of which the oxygen forms about 28 ounces. It would consequently take all the oxygen in 1,800 cubic feet of air to entirely consume a stove weighing 82 lbs. A stove heated red-hot and exposed to the air would certainly last as long as 10 months, and if it were completely burned in 300 days it would consume the oxygen in six cubic feet of air per day. Lavoisier and Sir Humphrey Davy estimated that a grown person consumes 24 cubic feet of oxygen per day, which



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is the quantity contained in 115 cubic feet of air; consequently it would require at least 19 red-hot stoves to burn the air as fast as one pair of human lungs. We have made a safe estimate, and it is probable that a stove would last much longer than ten months, and therefore, that, in fact, 50 or 100 stoves would not consume oxygen as fast as the breathing of one man.

There are other considerations, however, to be taken into account in estimating the effects of red-hot iron on the human system. Heat from warm iron, below the temperature at which it is luminous, passes through crystals of rock salt as freely as any other heat, but this heat will not pass through glass, while that from red-hot iron will; showing that there is a difference in the nature of heat coming from red-hot iron and that from iron at a lower temperature. It may be that the effects of these different kinds of heat upon the human system are as different as their effects upon glass. The mode in which heat operates upon the various viscera of our bodies is very mysterious, and if there is sufficient evidence that heat from red-hot iron is injurious to our health, the truly philosophical method is to accept the fact and act upon it, whether we can find what is called an explanation or not.

THE SKATING CARNIVAL.—Crowds enjoyed themselves happily by skating at the Central Park last week. Although the weather was severely cold, the ice was splendid and the animal spirits "tip-top." Statements have been made that about 600,000 pairs of skates have been sold in this city since the present winter commenced, and the recently patented kinds seem to be great favorites. The Philadelphia *Ledger* gives the New Yorkers a spice of its feelings in regard to skating as follows:—"New York boasts of her 20-acre skating pond, at the new park, scarcely larger than some of our brick ponds. If the citizens of that city wish to know what skating is, they should visit Philadelphia in winter, when they would see the Schuylkill frozen over for a hundred miles in length, and enough not only for all the citizens of the commercial metropolis, but sufficient besides for all the skaters in the Union. If the Manhattan Islander goes crazy over a 20-acre skating pond, what would he do with the Schuylkill, Wissahickon, Hollander's Creek, and the hundreds of other sources of enjoyment of that exercise which the youth of Philadelphia have at their command?"

PRESERVING MEAT.—A correspondent writing from Ickesburgh, Pa., says:—"It is not generally known that fresh meat may be properly covered with salt and pickle, and remain there for the usual length of time, and yet spoil after being smoked, from exposure, when in pickle, to too great a degree of cold. Fresh meat will freeze in salt pickle as soon as the temperature of the pickle is sufficiently low to freeze fresh water, and so long as meat remains frozen it will take salt very slowly."

## THE CHEMISTRY OF TANNING.

MESSRS. EDITORS:—I noticed on page 411, Vol. I. (new series) of the SCIENTIFIC AMERICAN, that A. F. O. of Albany, states certain results without assigning a cause. The effect produced by electricity on hides while in the "bait" is to soften and rot them. That the entire process of converting animal gelatine into leather (except the finishing) is purely a chemical transaction, I think may be fully established, by the simple fact that no mechanical appliances can convert hides and skins into leather without the aid of chemical combination. We concede that various mechanical arrangements are necessary to the production of leather, either as a preparatory or as a completion of the leather, after we have arrived at a chemical change.

The use of lime for the purposes of depilating, and the process of baiting and tanning following, are all chemical. Lime acts chemically on the hide for the purpose of loosening the hair. The use of hen manure, uric acid, for the purpose, as is commonly said, of "taking out the lime," is a chemical operation of the uric acid on the lime for the purpose of neutralizing the lime in the hide before tanning.

The effect of electricity generated from a battery, or atmospheric electricity in the lime bait or tan vat, is to concentrate the action of the lime in loosening, and the acid in baiting, and the tan in tanning, in each and every case objectionable. Atmospheric electricity during the process of bait universally accelerates and concentrates the action of the acid, rotting the hide in spots, finally irretrievably damaging the whole pack; the same result attends a long immersion in the baiting solution, which is one chemical reason at least for the lack of durability in leather exposed to the action of electricity. The same objections may be raised to the use of many salts, acids, &c., that are used for the purpose of saving time in tanning, also the use of chlorine (muriatic acid), and alum, as a preparatory to tanning; the last named, though old in the form of alum and salt, are exceedingly objectionable, either as preparatory or for tanning, (not tanning) its introduction as a preparatory must fail, for the good reason that the combinations are forced not natural chemical combinations.

W. S. B.

Cleveland, Ohio, Dec. 31, 1859.

## FINANCIAL CONDITION OF THE "GREAT EASTERN."

—The shareholders of the *Great Eastern* are sinking into an awful state of depression. The surveyor's report declares that not less than \$250,000 more must be expended upon her before she can be fairly said to be in a fit state for ocean voyages. The new company is said to be in debt, and her shares are at so low a figure that they can only be dealt in at a ruinous loss. Some of the proprietors, it is rumored, contemplate instituting proceedings through the Board of Trade, or in equity, to obtain a full account of the stewardship of the board of management. Something will have to be done, and that immediately. The shares are quoted at one-half, with one paid up. It is supposed that another new company will be formed, in order to get rid of the present board of management, and then, by the issue of 100,000 preference shares, to raise \$500,000 more, complete the vessel right off, and set her to business. Up to this time she has cost \$5,000,000.

COLD WEATHER.—The first severe cold weather that we have experienced this winter, came upon us on Tuesday night, the 27th ult. Wednesday morning at 6 o'clock the thermometer stood at zero, on Brooklyn Heights, and on Thursday morning it was 7° lower down still. Persons from the dry regions of the Northwest say they experience a keener sensation of cold in New York city with the thermometer at zero than in St. Paul, Minn., at 30° below.

A SMILE FROM CALIFORNIA.—J. G. Carson, writing from San Francisco, bestows upon us the following happy compliment:—"If the editors of the SCIENTIFIC AMERICAN have enjoyed the production of the 'new series' half as much as the readers have had pleasure and instruction from its perusal, it can no longer be said that 'the editorial chair is cushioned with thorns.' The very idea must be considered obsolete."