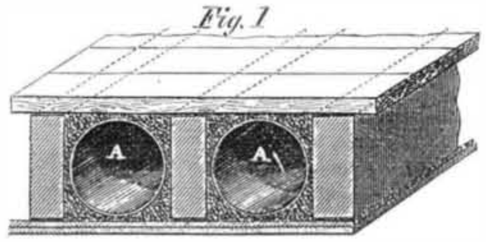
PROTECTION OF BUILDINGS AGAINST FIRES.

The guarding of buildings against the destructive agency of fire, is a subject worthy the attention of builders and property owners, and, in fact, important to all, especially those who dwell in thickly settled neighborhoods. Confining the fire to the floor or floors in which it originates, will frequently prevent an extensive destruction of property and the danger to life so often experienced in our crowded cities. The well known firm of R. Hoe & Co., manufacturers of printing presses and materials, in New York city, have been lately experimenting on a new plan of constructing ceilings and floors, intended primarily to ascertain the best method of preventing conflagration in the new building now in course of erection by the company, and calculated also to be of value to future builders.

Fig. 1



One of the firm says: "Many years since, I saw a store on fire in the Rue Vivienne, Paris, and was not a little surprised to see persons looking out of the windows in the story above the fire, quietly observing the labors of the firemen engaged in extinguishing the flames. Knowing that fires were rare in Paris, I was interested in examining the method of construction of buildings which inspired such confidence. I found that the floors were filled in solid with plaster of Paris.

"About ten years ago," he says, "our firm had occasion to enlarge our iron foundery, and it could be done only by carrying the extension under our carpenter and pattern shop. I caused the ceiling to be covered with sheet iron, and as each sheet was nailed up, it was covered between the beams with lime and sand mortar from three quarters to one inch in thickness. This was considered quite a security by our fire insurance surveyors; but it was never quite satisfactory to me as a perfect protection. Last year, our firm had determined to erect a fireproof addition to our factory, and I was considering how we could, at a moderate expense, make the old portion of our works comparatively fireproof. In conversation with Mr. R. G. Hatfield, architect, he suggested that to reduce the weight it would be well to put in iron pipes between the beams, and fill in with plaster of Paris; this made the basis of my first experiment, seen in Fig. 1. Other experiments have been made, as shown by the remaining figures."

Fig. 2

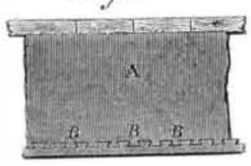


Fig. 3

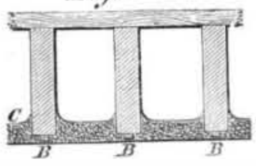


Fig. 1 is a representation of the construction of floors for the experiment referred to above. Upon the under side and across the beams were nailed strips of pine half an inch thick, and dovetail in section, serving to retain a ceiling of plaster of Paris, spread under the beams on the strips to the thickness of one quarter of an inch, and on their tops, between the beams, to a thickness of one half an inch. Upon this were placed, between the beams, tubes, A, of thin sheet iron, in this case of a circular section, or they may be made oval or rectangular, according to the spaces between the beams. The remaining space was filled in with plaster of Paris, completely enveloping the tubes. After the plaster had set, the flooring boards were fixed, and the plaster allowed to become perfectly dry and hard. A fierce fire was then lighted, within four feet of the ceiling, and kept up for four and a half hours. The result was, the plaster had cracked off in places, and the dovetailed strips were charred, but the beams were not injured, the fire having scarcely blackened them, and the floor above was never so heated but that a person could have stood on it barefoot without discomfort.

Fig. 4

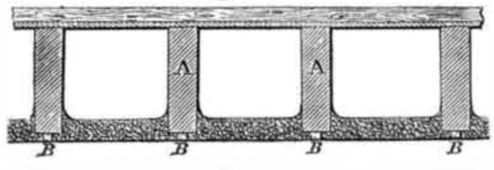


Fig. 2 represents a second experiment. Upon the under side of the beams, A, were nailed sheets of thin iron, crimped in a form to present dovetails, B, with the large parts downward. This was plastered with a "scratch" coat of sand and lime, and on this was placed a coat of one quarter of an inch of plaster of Paris. When dry and hard, a fire was lighted and kept up for two and a half hours, when the plaster cracked off and the beams began to burn.

In Fig. 3, strips of pine, B, one half inch square, were secured to the center of the beam, throughout their length. Plates of sheet iron, No. 21 wire gage, were nailed upon the strips, which kept the iron half an inch from the beams. Plaster of Paris was poured on the sheet iron to the depth of one and a quarter inches, and the sides and tops of the beams smeared with it, and rounded up at C, to some two inches on the sides. After the plaster had set, the floor boards were fixed, the fire lighted and kept burning for four and a half hours. The result was, in a few places a smoked appearance of the beams, but no other indications of fire.

Fig. 4 is a modification of Fig. 3, with the addition of thin sheets of iron on the tops of the beams, coated with plaster of Paris one quarter of an inch thick, on which the flooring was laid. The experiment with this device we witnessed a short time since, and for three hours a raging fire was kept burning under the ceiling, and for three hours more a fire was kept burning on the floor itself. The result was that no damage was done, and the floor proved to be entirely fireproof.

The following figures show the cost of this improvement: Cost of 10x10 ft. of fireproof flooring, prepared as per experiment, over and above the cost of ordinary flooring: Average thickness of plaster Paris, 1½ ins.—equal to 12½ cubic feet for the square of 10x10 ft., equal to three barrels of plaster, at $2 85—$8 55. Sheet iron on top and bottom, 200 square feet, No. 21 wire gage, 280 lbs. at 6c., $16 80; mason's and carpenter's time, five hours each, $4 75; total cost for square 10x10 feet, $30 10. The cost for a fireproof floor 100x25 feet, less walls, would be $678 45 more than the cost of the common combustible flooring. The cost of a brick and iron beam fireproof building is more than double the cost of a brick and wood structure.

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HOW TO TEST THE PURITY OF WATER.

It is of importance to be able to test the quality of water, not only when for special purposes absolutely pure water is required, but even in cases where such purity is not requisite, it may be of great interest to ascertain of what the impurities consist. The following short notice of the tests for the most commonly occuring impurities, will be welcome and useful to many of our readers.

PURE WATER MUST SATISFY THE FOLLOWING CONDITIONS.

1. It must have no residue whatever when evaporated in a clear porcelain or platina dish.
2. It must form no precipitate with a solution of nitrate of silver, which would indicate common salt, some other chloride, or hydrochloric acid.
3. It must not precipitate with a solution of chloride of barium, which would indicate a sulphate or sulphuric acid.
4. It must form no precipitate with oxalate of ammonia, as this would indicate some soluble salt of lime.
5. It must not assume any dark or other shade of color when passing sulphureted hydrogen gas through it, or mixing it with the solution of a sulphide salt, as this would indicate the presence of lead, iron, or some other metal.
6. It must not become milky by the addition of lime water, or a clear solution of sugar of lead, as this would indicate carbonic acid.
7. It must not discolor by adding solutions of corrosive sublimate, or chloride of gold, or sulphate of zinc, which discoloring would indicate the presence of organic substances. When boiling water with chloride of gold, the least trace of organic matter will reduce the gold, and color the water brown.

RESULTS OF THESE TESTS.

1. Almost all spring waters are found to leave a residue upon evaporation.
2. Common salt is not only found in most springs and rivers, but even in rain water, many miles inland, when the wind blows from the ocean.
3. Sulphuric acid and sulphates are found in many springs, the Oak Orchard Spring, N. Y., for instance, is very rich in the free acid.
4. Waters from lime regions all contain lime in large quantities, and, in fact, this is the most common impurity of spring waters.
5. Iron is contained in large quantity in the so-called chalybeate springs; also copper and other metals are encountered; lead incidentally, by the lead tubes through which it often is made to pass.
6. Carbonic acid is the most common impurity, even distilled water is not always free from it. Water will naturally absorb carbonic acid gas from the atmosphere, which latter always contains it; its principal source of supply being derived from the exhalations of man and animals.
7. Organic substances are often found in the water of running brooks, streams and rivers, and are of course obtained from the vegetation and animal life in the water itself, and from the shores along which it floats.

REMARKS.

1. The healthfulness of water depends on the nature of the residue left after evaporation; for many chemical and other operations, where absolutely pure water is required, the leaving of residue at once proves the water unfit for use.
2. The existence of small quantities of common salt in the water is not objectionable, it being not injurious to health.
3. Sulphuric acid and sulphates may be objectionable for daily use; however, such waters are used medically to stop diarrhea and excessive tendency to perspiration.
4. Lime waters do not agree with some constitutions, producing diarrhea and diverse disturbances; very small quantities of lime, however, are not injurious.
5. Iron is healthy, and is a tonic; in fact, this metal and manganese are the only ones which may be used in large doses, not only with impunity, but even with benefit: however, there is also a limit. Over doses of iron may produce diarrhea and slight eruptions of the skin, or pimples.
6. Carbonic acid is not objectionable when drinking the water; on the contrary, it makes it more palatable, and most mineral waters owe their reputation to this substance.
7. Organic substances are perhaps the most objectionable, principally when decaying; such waters may even propagate diseases, and require careful filtering or boiling, or both, to make them fit for internal consumption.

* There are a great number of mineral waters of diverse celebrated springs, which contain many other substances, but usually in very minute quantities; only it is beyond our present intention to go into details about substances not commonly encountered.

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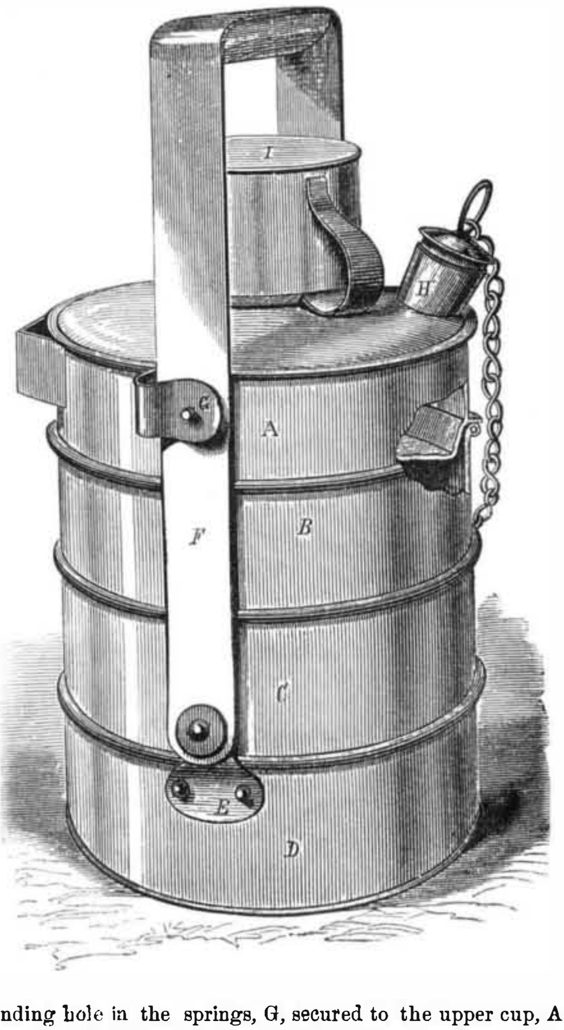
WAGNER'S IMPROVED DINNER PAIL.

The extent of the "tin pail brigade" which any early riser in our cities and manufacturing towns may see, comprising the honorable guild of the country's wealth producers, proves the value and importance of such a device as that shown in the accompanying engraving. The object is to furnish a handy and convenient receptacle for food, designed for workmen and tourists, and it is so constructed that the aroma of one kind of food will not affect the flavor of another. The cups, A, B, C, D, sit one upon and partly within each other, being supported in position by flanges near the bottom and projections at the top. The lower one, D, has ears, E, to which is pivoted a bail or handle, F, held in an upright position by means of a pin on each side engaging with a corresponding hole in the springs, G, secured to the upper cup, A. Thus all the compartments are firmly locked together. This top cup is designed for holding coffee, tea, milk, or other beverages, and has a spout, H, fitted with a cork, and a receptacle on the top for salt or other condiment, covered with a drinking cup, I. A clasp on the side serves to hold a knife and fork, or spoon.



With this device a dinner of several kinds of food may be carried safely, the vessels holding each sort serving as dishes from which the food may be eaten.

Patented through the Scientific American Patent Agency, March 31, 1868, by John Wagner, who may be addressed for purchase of rights at Cumberland, Md., care of S. J. Edwards

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An Air-tight Galvanic Battery.

Mr. Chester, electrical instrument maker, of this city, describes in the pages of a contemporary a new form of galvanic battery, the beauties of which are cleanliness, portability, and power, besides entirely dispensing with acids, preventing evaporation and the generation of gas, and obviating the removal of the exciting fluid when the battery is not in use.

The battery is made up of glass cells three inches long and one inch in diameter, inserted in a wooden block; a zinc cover is provided for each glass, and a projection from this zinc cover, running down into the glass, forms the zinc element The other element is carbon, carefully connected with platinum, and well insulated from the zinc cover. This cover has a plate of soft rubber interposed between it and the glass top, and the packing is made completely air-tight and water-tight by the pressure of two rubber springs pulling the cover firmly down. Connection from one cell to the next is quickly made by short pieces of spiral springs. The battery is charged by filling the glasses half full of water, adding some bisulphate of mercury, and a little shred of cloth is interposed between the plates so as to retain moisture. To use this battery it is necessary to invert it, and thus allow the fluid to flow over the plates and saturate the piece of cloth. Restoring the battery, the fluid leaves the plates, though a drop remains in the cloth shred, and in this state, simply from these drops of moisture, powerful intensity currents, producing violent muscular contractions, are given off, and this is the case even forty-eight hours after the immersion of the plates. It is evident that if we can employ these currents, resulting from the simple expenditure of one drop of the fluid, usefully, that we have exhausted a very small portion of the force in reserve, and it is also evident that we