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The Real Cause of the Fishy Taste of Boston Water.

When we first noticed the Report of the Superintendent of the Boston Water Board respecting the fishy taste of the water in that city, on page 109, this Vol. SCIENTIFIC AMERICAN, Prof. Horsford, of Harvard University, and Dr. Jackson, of Boston—both distinguished chemists—had been appointed to make examinations, analyze the water, and report on the same; we used the following language, "it may turn out that the disagreeable taste in the water has been caused by minute *animalculæ*." On page 133 we presented the substance of the reports of these distinguished chemists, both of which attributed the bad taste to vegetable matters. On page 134 we presented the opinions of Dr. Nichols, of Haverhill, Mass., who attributed it to a slime which accumulated on fish when deprived of great quantities of fresh inlet water. In the new volume of *Annual of Scientific Discovery*, just published, there is a paper by Dr. A. A. Hayes, of Boston, read by him at a late meeting of the American Academy, which proves conclusively that if Dr. Jackson and Prof. Horsford had taken the hint respecting the *animalculæ* theory, they would have been enabled to make correct reports. Dr. Hayes, with a practical eye, has discovered the true cause—the animalculæ. He says, "late in Dec., it was found that an enormous increase of animalculæ took place, the *cyclops* and *daphnia*, predominating, although the temperature of the water was below 40° Fah. When arrested by a coarse filter, these crustacea appeared to the naked eye of different colors, and were so distended as to have a gelatinous form, like broken down tissues of fish. Water freed from these had no odor, while the mass on the filter had a strong fish odor, and would impart it to other water. Oil could be abundantly obtained from the deposit, and repeated trials showed that this *was the source of the odor and taste of the water.*"

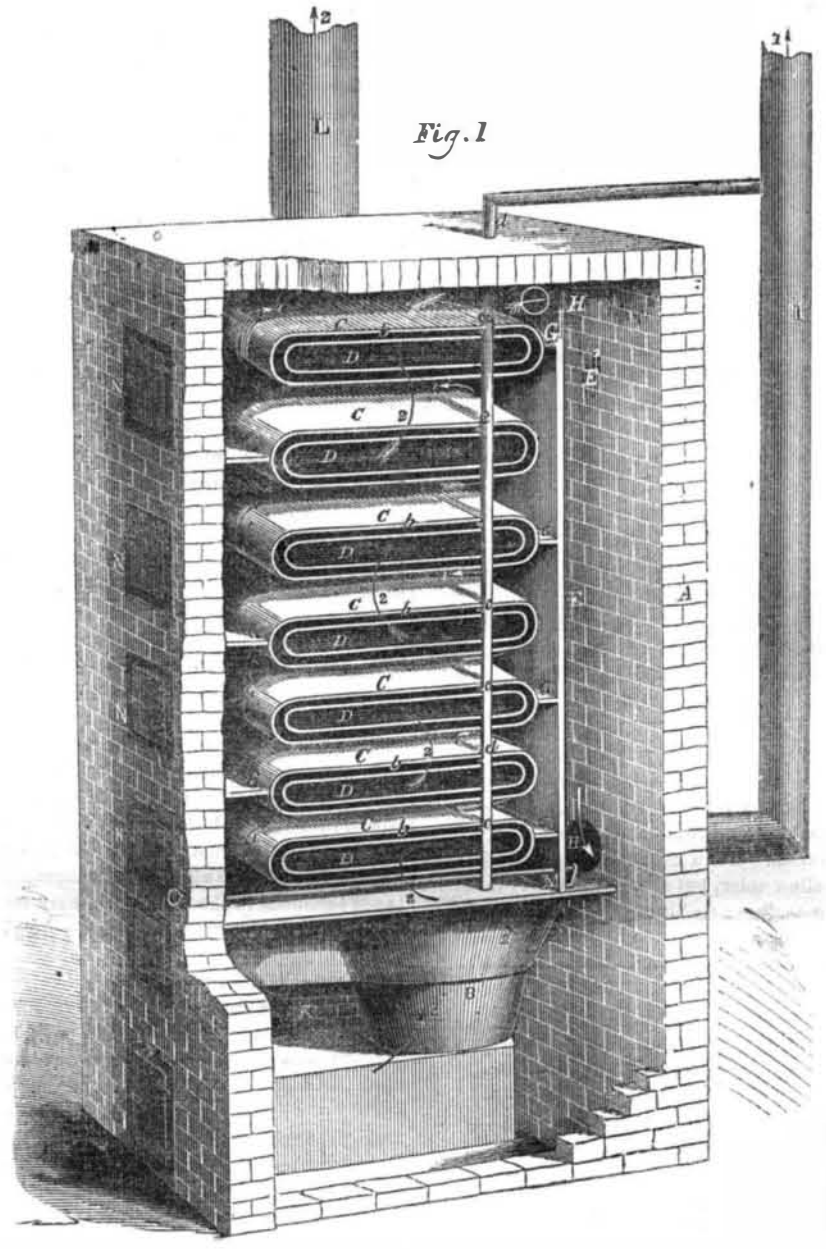
Dr. Hayes carried his results and specimens to Dr. Bacon for microscopical examination, and he pointed out two species of *cyclops* and *daphnia*, whose *bodies* seemed to be filled with oil. The paper forcibly concludes as follows:—"The general result of both chemical and microscopical examination is, that the odor, taste, and oil of the water are due exclusively to the live, dead, and decomposing animalculæ of the two species named." This is the conclusion of the whole matter.

Oil for Machinery and Illumination.

We refer our readers to the advertisement of F. S. Pease, Buffalo, N. Y., manufacturer and dealer in oil for burning, and the lubrication of machinery. For the latter purpose, the one with which we are more especially acquainted, his oil has a deservedly high reputation. On our railroads, oil forms a very large item of the annual expenditure, and it is the duty of superintendents to use the best and cheapest. Mr. Pease's oil has this character.

HOT AIR FURNACE.

Fig. 1



The annexed engraving is a perspective view of an improvement in hot air furnaces, for which a patent was granted to Abel H. Bartlett, of King's Bridge, Westchester Co., N. Y., on the 30th of January last.

A represents the casing or wall of masonry which surrounds the furnace; B is the fire chamber, and C is the flue of the fire chamber which is of serpentine form, and passes around flat horizontal chambers, D, which form the air heating chamber, the horizontal chambers, D, extending the width of the chamber or compartment which forms the flue, C, both ends of the chambers, D, communicating with the space between the side plates of the flue, C, and the masonry, A. A suitable space is left between the chambers, D, to allow the flue, C, to be of the requisite size; E is the back plate of the flue, C, or rather the upright portion of it, a space being left between the plate, E, and masonry, A, said space being a continuation of the flue, C, and having a downward draught; G are plates connected alternately to the sides of the chambers, D, and the back plate, E, and masonry, *a*, at the front of the furnace, for the purpose of causing the draft and heat from the fire chamber, B, to ascend in serpentine form, and between the chambers, D; H H are openings at the upper part of the plate, E, and I is the smoke pipe which communicates with the lower part of the space between the plate, E, and masonry, A. K is an opening at the lower part of the masonry, A, through which the cold air is admitted, and L is a pipe which communicates with one end of the uppermost chamber, D; M is a damper at the lower part of the space between the plate, E, and masonry, A. If a direct draft is required at first in order that the fire may be made quickly, the damper, M, is opened, and the draft is direct from the fire chamber, B, to the smoke pipe, I. When the damper, M, is closed, the draft and heat pass upward through the flue, C, in the direction indicated by arrows, 1, the plates, G, causing the heat to pass upward in serpentine form and horizontally between the chambers, D, the heat passes over the uppermost chamber, D, and through the openings, H, and down the space between the plate, E, and masonry, A, into the pipe, I. The cold air meanwhile passes through the opening, K, at the lower part of the masonry, A, and ascends, passing in one end of the lower chamber, D, and out at the opposite end, and ascends in serpentine form through the chambers, D, as indicated by the arrows, 2, and the air in passing through each of the chambers, D, is subjected in broad thin layers, to two broad heated surfaces of the flue, C, and when the air reaches the uppermost chamber, D, it passes in a perfectly heated state into the hot air pipe, L. Thus it will be seen that the air to be heated, and the draft and heat from the fire chamber pass upward simultaneously in their respective passages, and cross each other at right angles, the air in the chambers, D, being exposed to two heated surfaces of the flue, C, viz., above and below, and the horizontal portions of the flue, C, communicating heat to two surfaces of the chambers, D, also above and below. The cold air, therefore, that enters the opening, K, passes over a great area of heating surface in passing upward to the pipe, L.

The air-heating chambers, D, are lined, or are formed of two thicknesses of metal, so as to leave a space, *b*, around each chamber, and these spaces are connected by small horizontal pipes, *c*, to a vertical pipe, *d*, which communicates with the smoke pipe, I. By this arrangement the air, in passing through the chambers, D, is prevented from being impregnated with any deleterious gases that may escape through the pores of the iron of the flue. C, for when it has passed through the inner thickness of metal into the spaces, *b*, it will, instead of passing through the outer thickness, naturally pass through the small pipes, *c*, into the vertical pipe, *d*, and thence into the smoke pipe, I.—The heated air therefore passes into the pipe, L, in a perfectly pure state, and may be conveyed therefrom through suitable pipes to the apartments designed to be heated. The doors designated by N are merely for the purpose of enabling the flue, C, to be cleaned.

The patent embraces four claims, which will be found on the list of the above date published in our columns. This hot air furnace possesses a number of advantages. The idea of lining the flues, and carrying off the carbonic acid gas which escapes through joints, is a good one, as it provides a means of keeping the air more pure than it would be otherwise.

More information may be obtained by letter addressed to Mr. Bartlett.

Lime in Agriculture.

Prof. Johnson says, "the effects of lime are greatest when well mixed with the soil, and kept near the surface within easy reach of the atmosphere. Its value is greatest upon newly ploughed arable surface soils.—Such soils usually contain a large amount of vegetable and other organic matter, hence the rule that lime ought always to precede putrescent manure when old leas are broken up for cultivation. It produces a greater proportional improvement on poor soils in their natural state, than on such as are richer; as naturally poor soils contain a greater or less quantity of organic matter, but are nearly destitute of lime. On the other hand, on poor arable lands which have been worn out by repeated liming and cropping, it does no good whatever, as such soils, if they do not already abound in lime, are generally destitute of other kinds of food, organic and inorganic, by which healthy plants are nourished, and they can only be restored to fertility by a judicious admixture of all. On all lands in which vegetable matter is wanting, lime may even do harm to the immediate crops. A consideration of the circumstances above adverted to are sufficient to induce the entire abandonment of it. Where soil has been impoverished through its unskillful application, or by large admixtures of lime and marl for a series of years, new additions are a waste of material and labor. When natural causes have removed the superabundance, and produced an accumulation of those other substances which, when associated with lime, increase the productiveness of the soil, its use may be resumed."

Quite a discussion has been going on in the Quebec papers, respecting a substance found among the rocks near that city, which burns like sea coal. Mr. Logan, the government geologist, affirms it to be nothing but an erratic bituminous shale, while others believe it to be real coal.