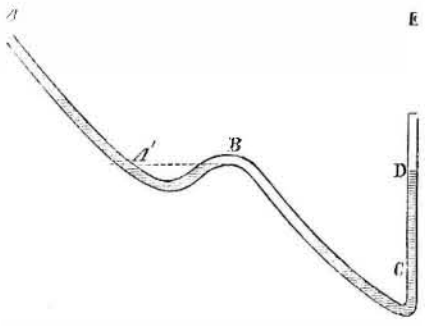
Science and Art.

Anomalous Action of Water in Crooked Pipes.

We are solicited by a correspondent to explain both the cause and effect of accumulations of air in crooked pipes. It is a subject of great general interest. In almost every case where water under pressure is led over elevations without openings or leaks of some kind, air accumulates and produces the very disagreeable effect of diminishing the pressure or the rise of the fluid at the point of discharge. The evil is so serious that self-acting valves have been applied in some cases at these points, to open whenever the presence of air expelled the water so that it refused to support a float. A very small leak might be allowed in most cases to remain always open, and this would accomplish the same object, though involving a waste of water; but, if practicable, a small pipe carried up from the bend to above the level of the fountain, and kept open at the top, would be a more perfect remedy.



The accumulation is due to the fact that air is always present, in greater or less quantities, in all but very recently distilled water. It exists in very minute particles or bubbles, and is in this form the means of sustaining life in the whole race of fishes which enliven its depths. The lungs or gills of a fish cannot decompose water; the only oxygen fish consume is that freely suspended in the form described. It is a singular fact that the gases naturally absorbed by water from the atmosphere contain a sensibly larger portion of oxygen than common air, a circumstance extremely favorable to submarine existence.

The quantity so absorbed varies with the temperature and with the agitation. The large or small waves caused by wind, assist in "aerating" the water, and a constant agitation tends to hold in suspension any surplus it may contain. But while standing or moving in a pipe, the surplus rises, and having once accumulated in bends refuses to be removed except either by a violent rush, which shall carry it bodily down, or by a long struggle with the passing water, which is thus gradually induced to absorb it.

The accompanying cut illustrates its effect in diminishing the rise of the water at the termination of the pipe. The supply of water is received at A. but the fluid, instead of rising to E, rises only to D, at the other extremity. Explanation is found in the fact that the air retained is not equally divided on each side of the bend, at B, but is all on the side represented, and by being of no appreciable width, its presence diminishes the effect of the head. It is the pressure at C which forces up the water in the pipe, C E, and this ordinarily depends on the hight of the reservoir, A, but all that quantity between B and A', of course, balances itself, and is of ne effect, and if a portion of the remaining length, A C, is air, its effective hight is diminished by the same amount. The water and air will remain under pressure for an indefinite period in the position represented, but if by any means motion be induced, the water will usually flow over the bend at B, and run down to C, without quite filling the pipe, and consequently without removing the air except by the slow absorption referred to. The rise in C D will be diminished still more if there be several bends like B at intervals. The spiral pump, invented in 1746 by a Swiss named Wirtz, is an ingenious application of a similar principle to produce the reverse effect. In this pump the turns of the spiral are partially filled, and all, by compressing the air in the remaining spaces, and accumulating the mass of weight on one side of the center, conspire to force the water to any hight required in the discharge pipe.

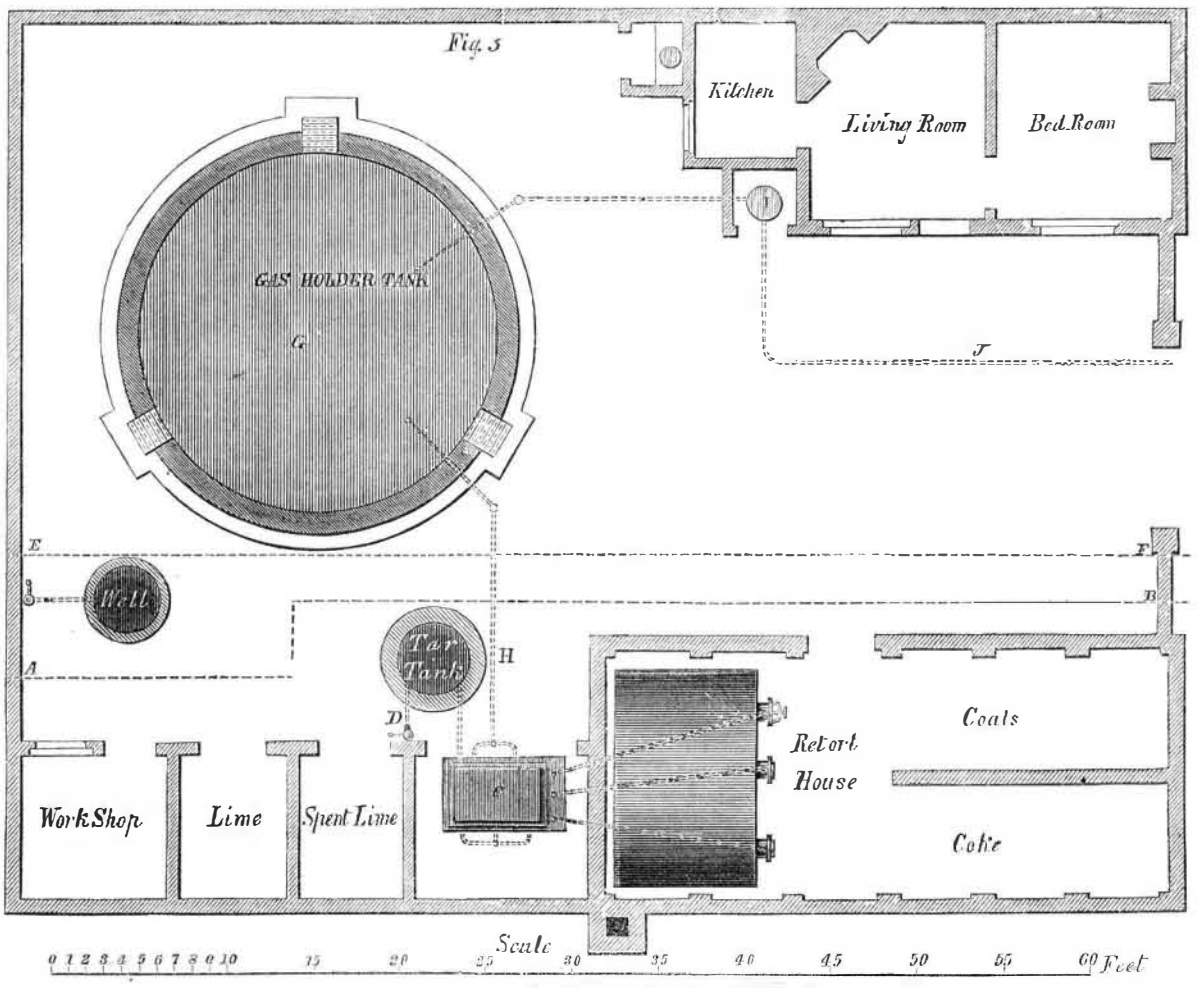
The Egyptian Steam Yacht.

The iron steamship *Voyageur de la Mere* built for the Egyptian Government, was launched at East Boston on the 25th of last month. She is 216 feet long—the largest iron vessel ever built in America, and differs from vessels of this description built elsewhere, in being additionally strengthened with wood. She will, when completed, proceed to Alexandria *via* our city.

The Mechanics' Club.

This Association, which meets at the American Institute Rooms, 351 Broadway, on the 2nd and 4th Wednesday of every month, is worthy the attention of all who can attend either regularly or otherwise. The next question is "The best means of conveying steam from the boiler to the engine."

GAS LIGHT FOR VILLAGES.



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The work and apparatus represented by these engravings are designed for villages containing a population as low as 1000 inhabitants. But if the houses are situated at a considerable distance apart, the original expense of the *plant* is greater, because a much greater length of main and branch pipes are required. Gas, therefore, can be most economically employed where the houses are closely situated together. There are many villages, however, containing from 5000 inhabitants and upwards, whose streets and lanes are nightly submerged in darkness; these, we believe, might have their streets rendered cheerful and luminous at no very great expense, by gas light. It may be difficult for the inhabitants of some villages to raise the capital necessary for the erection of such works, but the way this difficulty has been overcome in England, is perhaps worthy of imitation here. An association has been formed with considerable capital, and with a staff of experienced and competent officers, who can estimate the exact expense of erecting gas works in any place, according to its location and the number of its inhabitants. If application be made to this company, by authorized persons from any town or village to erect gas works, they at once dispatch an officer to survey the place, and, upon his report, an answer is returned. Their custom is to erect the whole works, lay all the main pipes, and supply the meters and fixtures at their own cost, charging a certain amount per thousand cubic feet of gas consumed, and a rent for the meters and fixtures. This is the way the company will contract for supplying gas to any place; or else it will erect the works and put them in complete working order for a specified sum, or admit villages to hold any amount of stock which they can afford to purchase. They have erected works upon this principle in a number of small towns, all of which have proved profitable investments. One feature in the arrangements of this company should be carried out in all our cities where gas is now used, viz., the supplying of lateral pipes, meters, and fixtures, at a fixed rent, to those landlords who may apply for them. If this method were carried out, the consumption of gas would be vastly increased, because thousands of tenants—mechanics, and other working men—would prefer to use it in preference to any other kind of light. And as the profits of the company would increase with the increased consumption of gas, this plan would lead to a general reduction in the price of gas to all the citizens.

The apparatus illustrated above is designed for the manufacture of coal gas, and wherever bituminous coal is cheap, it is the most economical gas material. In some places gas from resin or resin oil, or even from some kinds of wood, may be manufactured with advantage. The finer kinds of bituminous coal—such as cannel coal or rich hydro-carbon schale, are the best for gas-making purposes. Nothing is lost, every part of their product is useful. The coal is put into close retorts and submitted to destructive distillation; the volatile matter escapes in the form of gas from the retorts represented in the lower part of figure 3, and passes into the purifier, C, where it is washed, and its impurities removed by coming in contact with wet lime; from thence it passes into the gas holder tank, G, where it is kept for general distribution. The products of the coal are, gas, tar, ammonia, and sulphate of lime; the residue left in the retorts is coke. The coke is excellent for burning in grates or furnaces the tar is useful for preserving the feet of fence posts under-ground, and for roofing sheds and barns, when mixed with dry clay and sand; the spent lime in the purifier is a good disinfecting agent: thus all the products of the coal employed in gas lighting, may be utilized. This subject is engaging no small amount of attention at present, both in this country and Great Britain, and any improvement or economy in the production or purification, is worthy of extensive diffusion. Many of our factories are lighted quite successfully from miniature private gas works, and it has even been attempted with tolerable success on one of the large steamboats navigating the Hudson river, the gas works being so small and inoffensive as to be stored on board without serious inconvenience.