

as an oxidizer and a diluter, and renders the unwholesome gases from drains less dangerous.

3. Water in a trap has only a limited effect in retarding passage of gases from one side of the trap to the other. Water has also the power of absorbing the foul air of the soil-pipe sewer which are given off by it with great freedom. Water has also the power of absorbing the germs of disease from air with which it is in contact, or of absorbing other infection the air may contain, and of retaining it for a considerable time.

4. Although the water-seal will not prevent the transmission of gases, it does form a barrier to *currents* of foul air, unless subjected to a pressure sufficient to overcome its hydrostatic force.

5. Air, in the condition which is the very worst in its effect on health, is very often far off from stinking gases.

6. That a proper system of ventilation to all house drains, and a supply of fresh air will carry off foul gas which would otherwise pass through the traps.

Most of waste matter is retained in the water-trap of the soil pipe or drain until sufficiently decomposed to generate gas, and as the decomposition takes place without the presence of sufficient air to carry it quickly to completion, then becomes established a condition most favorable to disease to which an ineffective water-seal is no barrier at all. In many cases also, the cistern of the water-closet absorbs the gases which ascend to it and add another hidden danger to the house.

Happily all these difficulties may be easily overcome by a proper superintendence over every detail of construction in connection with the plumbing, ventilation and other sanitary appliances of a house, particularly in the doing away with the use of water-traps when so situated that they can retain decomposing organic matter where it will do harm. We must secure not only a free circulation of air through all the soil pipes and house drains by the introduction of fresh air constantly flowing through them, but we must also secure baths and wash-basins from gases passing through them by the absolute closing of their waste through over flow pipes, except when absolutely in use; the pernicious system of discharging the waste water directly into a foul closet-trap particularly when so many closet pipes have no ventilating shaft connected with them, has made the bath pipe the ventilator of the foul closet-trap, and has doubtless been the cause of more deaths from zymotic diseases than the public or physicians have any idea of; it is a most dangerous system, and cannot be too strongly condemned and exposed.

In closing these remarks we have to express our obligation to a valuable paper read by G. E. Waring, jr., at the annual convention of the American Institute of Architects, and to the Sanitary Engineer, for many suggestions herein appropriated for the benefit of all interested in sanitary reform.

DRAWING AS THE LANGUAGE OF MECHANICS.

Few persons, if any, who can hold pen or pencil are totally devoid of the power of drawing. The delineations may be rule as the "picture letters" of a red Indian, but they will convey, more or less perfectly, the meaning of the draughtsman.

Our purpose is to speak of those who can draw with tolerable accuracy so far as making the hand obey the eye, but who, for want of training, often fail utterly to make such drawings subserve their aims. We are not now speaking of drawing as an artistic accomplishment, but in the sense indicated by the title

of this article. A mechanical drawing is the most efficient, often the only efficient, mode of describing the construction of a piece of mechanism. To do this effectually the drawing must follow certain fixed rules. Just as a collection of words strung together in defiance of syntax are but jargon, not language, so any attempt at a mechanical drawing which does not observe the conventional rules of the art is more or less meaningless. Now a man may make a drawing faultless in every line and curve, nay, even beautifully shaded and coloured, and yet convey scarcely any meaning, while another will, by a few lines, show all that a good workman needs to enable him to make the article intended to be described. In mechanical drawings correct sections are of all things the most important, and of all things the least often met with, except from the hands of trained experts. It may be said, "How can any but trained experts be expected to make correct mechanical drawings?" The answer is, that time back, when a man wanted any writing done he had to apply to a public scribe; but that man who now-a-days could not write an ordinary letter would be thought little of. How often do tradesmen, when writing to a merchant or manufacturer, need to describe their wants by something more than words? And in how many cases are they able to sketch correctly what they require? No knowledge that a man could possess would be found of greater utility than a power of making a good sketch of anything which words failed to fully describe.

We are not advocating that everyone should expect to become an adept in the more difficult branches of mechanical drawing; but we do consider that more attention should be paid in educating young men in the rudiments of this useful art. Everyone might be taught how to show a section of any ordinary article of simple construction. And, further, the exact meaning and value of sections to the artificer might be profitably pointed out. If, also, a general appreciation of the value and convenience of what are known as "section papers" was brought about, great benefit would ensue. The publication of a simple series of examples of mechanical drawing, having strictly in view what we have pointed out, would do much good. All the existing handbooks go too far, and are fit rather for the engineering pupil than the general man of business.

WATER GAS AS FUEL.

A propos of the interesting discussion that has been going on recently as to the economic possibilities held out by the new water gas, (hydrogen and carbonic oxid), the *Engineering and Mining Journal* expresses the conviction that the time is near at hand when this new gas will come into general use, replacing coal for domestic purposes, in cities at least, and in many metallurgical operations. That journal now maintains that recent experiments have fully proven that enriched water gas is a cheaper and much better illuminant than coal-gas, but for purposes of illumination both methods will probably be superseded by the electric light.

As for the industrial application of the new process, the Swedish iron masters have been the first to thoroughly investigate the subject. They recently invited Mr. George S. Dwight, a well-known American metallurgist, to erect experimental works for the manufacture of water-gas by the "Strong process." These works afforded opportunity for making the most careful tests of the relative value of water gas, Siemens gas, and illuminating coal-gas, and of the adaptability of water-gas in many of the operations of iron manufacture. These experiments have induced eminent Swedish metallurgists to predict a revolution in the Swedish iron industry, from the advantage which the new system brings them. Large permanent works are now being erected in Sweden, and preparations are making for the adoption of a method in Russia and Germany.

The tendency towards the adoption of the new system in this country for illuminating purposes is quite marked. Already the gas companies in the cities of Scranton, Toronto, Yonkers, Baltimore, Phoenixville, Harrisburg, and several other places have adopted the new process.

We may add to this that one of the lately established gas companies in New York city, has from the first adopted this method, and has for some time been in very successful operation. It is the Municipal Gas Company, foot of 44th street, North River, where the works for the manufacture of water gas are constructed in the utmost perfection. In Brooklyn another water gas company has been established, which is now laying down its pipes.