

ENGINEERING DEPARTMENT.

A. W. CAMPBELL,
O.L.S., C.E., A.M.C.S., C.E.
EDITOR

Pure Water for Cities.

It is undeniable that an abundant supply of water for all cities and towns is not only desirable from every standpoint, but it is absolutely necessary. Health, cleanliness, safety and industries demand it. It is a well known fact that there is an undue prodigality in the use of water, and with the quantity now used every city should afford more public baths, playing and drinking fountains.

American cities are far behind many European cities in these benefits, and yet afford so much greater supply. While every provision is being made for a generous supply, and millions upon millions of dollars are to be spent in storage and distribution, there is comparatively little being said or done about securing absolute purity. So much serious trouble is occurring all the time at various places from polluted water that it seems inexplicable that those in authority should be slow to take action toward securing a perfectly pure water for the people.

First attempts were made at filtration in England about fifty years ago, and ever since Europe has been experimenting in filtration of public water supplies. Obvious benefits are demonstrated in the decrease of death-rates wherever filtered water has been permanently established.

Filtration, as carried on under the latest improved methods, is not a costly matter. It is vastly cheaper than sickness and death to a community. It is commonly thought that if filtration clarifies water, that is sufficient; this is a mistake, and can readily be understood to be so when it is known that a million or more bacteria may be present in a glass of clear water, and yet not affect its clearness. The filtration of water means straining it through a substance which removes all or most impurities, and it is not properly done unless the straining is so fine as to remove the infinitesimals called bacteria, which measure one-thousandth of an inch, more or less. It is the only absolutely safe method as far as is known at the present time for domestic purposes when the supply comes from the surface, as from rivers. The latter water supply is more likely to be wholesome than the others, for the reason that large reservoirs afford time for water to settle, and any pathogenic bacteria which may be present have an opportunity to sink to the bottom or be destroyed by the beneficent bacteria. There is also more or less beneficent action upon the water by the sunlight, but even this protection is not considered entirely sufficient in the light of recent experiments.

Filter-beds are unanimously agreed upon by almost all expert engineers as the

only true way of filtering water for public supplies. A filter-bed consists of a horizontal layer of rather fine sand, supported by gravel and underdrained, the whole being inclosed in a suitable basin or tank. The water in passing through the sand leaves behind upon the sand grains, the extremely small particles of which are too fine to settle out in the settling basin (through which the water first passes direct from the river for the purpose of allowing the mud to settle), and is quite clear as it goes from the gravel to the drains and pumps, which forward it to the reservoir or to the city. The coarser matter in the water is retained on the surface of the sand, where it quickly forms a layer of sediment which itself becomes a filter much finer than the sand alone, and which is capable of holding back under suitable conditions even the bacteria of the passing water.

When the layer of sediment becomes so deep as to prevent the proper straining of the water, the rate of pressure and other features being regulated by expert superintendence, the layer is cleaned. This is done at regular intervals. This sediment layer is a valuable element in aiding perfect filtration. It becomes a sort of jelly-like mud, formed of the bacteria and other particles, which afford not only an almost solid mass which holds back the infinitesimals, but is a kind of battlefield where the opposing armies of bacteria slaughter the harmful kind, thus cleaning out those we would be rid of.

So valuable is this sediment layer that after a filter-bed has been scraped clean a new thin layer is allowed to form before the water passes into the basin.

In speaking of the efficiency of the system of mechanical filtration in the city of St. Thomas, the city engineer in a recent report to the board of water commissioners said: "I consider the service and utility of our system clearly shown from the decided and beneficial results of chemical and bacteriological analysis of the water before and after filtration. Surely these proofs must convince those who at one time were opposed to the system, on the ground that it would not clarify water, and obstinately denied the claim that soluble matter or morbid germs could not be filtered out of water, and even now it is possibly useless to present to such men existence of the facts which they have so long forbidden with the whole of their professional and official authority. I have no hesitation in pronouncing, from the already ample and accumulating proofs that chemico-mechanical filtration properly provided and managed, is now an art that can be relied on to produce from contaminated streams a practically pure grade of water, free not only from suspended, but from soluble and even living ingredients, and that not in limited quantities merely, but in water tolerable to the senses.

Farmers and Good Roads.

It is the "old county paper" that the farmers read most carefully. A translation of some learned scientist's essay, republished in the *Uppercrust Review*, never touches them. They never see it. Not that the farmers of the country are not extensive readers, but their reading, like charity, begins at home.

If Bill Jenkins, their local newspaper man, says they should have better roads in their vicinity, it carries with it ten times the force it does when Prof. Noah Heap Whiskers, of Yarvard College, says the same thing in the *Hummingbird Critic*.

The rural press is in touch with the people, and it is through the country newspaper that the gospel of good roads is now being preached to the farmers of the land.

To the farmers who, when the subject of good roads is under discussion, declare "we will not submit to additional taxation to improve our roads," the rural press responds: "You are submitting to taxation every day, the most burdensome taxation, by your failure to tax yourselves to improve your roads. The wear and tear of your vehicles, your losses in time on account of poor roads, your losses by reason of the small amount of freight you are able to transport, and above all the heavy losses that poor roads give to the reputation of the state constitute an annual burden of taxation ten times greater than the amount you would be compelled to bear to give you improved highways." With the local newspapers in every vicinity working for improved highways, and the agricultural press paying especial attention to the subject, the farmers will soon be as enthusiastic for good roads as their brother wheelmen.—*L. A. W. Bulletin*.

Impassable Roads, Sidewalks and Law.

We are asked whether a wheelman may ride on the sidewalk when the road for any reason is impassable.

We do not understand that from a strictly legal standpoint the condition of the street has anything to do with the case, though morally it should be taken into account in passing sentence on the arrested wheelman.—*L. A. W. Bulletin*.

The town council of Dundas, Ont., have at length decided to replace the Creighton road bridge by an entirely new one and the Hamilton bridge company have been awarded the contract for an iron one.

Windsor, Ont., is going to use natural gas for fuel at the electric light works and pumping station. The annual cost is estimated at \$1,900 at the lighting-station and \$4,000 at the pumping-station which will be a saving of several hundred dollars.