The Canadian Engineer

Vol. VI.-No. 6.

TORONTO AND MONTREAL, OCTOBER, 1898.

PRICE, 10 CENTS \$1.00 PKR YEAR.

The Canadian Engineer.

--_ -- -----

LIVIL, MECHANICAL, ELECTRICAL, LOCOMOTIVE, STATIONARY, MARINE, MINING AND SANITARY ENGINEER, THE SURVEYOR, THE MANUFACTURER, THE CONTRACTOR AND THE MERCHANT IN THE METAL TRADES.

SUBSCRIPTION-Canada and the United States, \$1.00 per year, Great Britain and foreign, 6s. Advertising rates on application. Orricks-62 Church Street, Toronto; and Fraser Building, Montreal.

BIGGAR, SAMUEL & CO., Publishers, Address-Fraser Building,

E. B. BIGGAR R. R. SANUEL

ANUEL MONTREAL, QUE. Toronio Telephone, 1892. Montreal Telephone, 2589.

All business correspondence should be addressed to our Montreal office. Editorial matter, cuts, electros and drawings should be addressed to the Toronto Office, and should be sent whenever possible, by mail, not by express. The publishers do not undertake to pay duity on cuts from abroad. Changes of advertisements should be in our hands not later than the 1st of each month to ensure insertion.

CONTENTS OF THIS NUMBER:

PAGE. PAGE. Biodgett's Combination Twist Drill, Thread Pitcb, Centre and Tap Drill Gauge	PAGE. Mailne Engines of the Great Lakes, The
Indus rial Notes	of
Lufer Prisms, Fire-proof construc- tion with	Tarred Macadam for Roads

PURIFICATION OF SEWAGE BY IRRIGATION.

BY W. M. WATSON.

There is a good deal of misconception with reference to sewage purification by irrigation. It appears natural to convey all filth and manure to the land from whence it came, and make the cycle of production and consumption complete, and probably on this ground the many scientists and public officials favor irrigation. But experience and discovery have shown that land can only act as a filter, that is, a place for the lodgment of micro-organisms, that live and do the work of cleaning the dirt from the sewage, thus bringing the fluid back to its former state of putity. To enable the microbes to do this, that able scientist, W. E. Adeney, proves that air must be supplied and properly distributed to every separate atom of sewage in the proportion of three parts of air to one of sewage. Air cannot possibly be distributed into all the particles of the soil of a farm or any other land to a greater depth than about one foot, and often less, and when sodden with water or snow very little if any atmosphere can penctrate. Many inventions are being tried to aerate even artificially made filters. The best yet known is to fill the filter quickly, allow it to stand for a given period, then slowly draw the fluid off. As the fluid settles from the filtrate air is drawn into the interstices between the small cubes the filter is filled with, in that way the micro-organisms secure sufficient oxygen to give them vitality. By another method porous pipes are placed among the small cubes of coal, coke, clinkers, or

whatever material may be used to filter or separate the particles of sewage fluid and atmospheric air passed through them at a pressure of about four inches of water by a fan, so that a constant supply of air is conveyed to the interior of the filter and is distributed throughout during the time the sewage is passing through, and on that account the filters work continuously. It is obvious that land that cannot secure air except at the surface, therefore cannot form a lodgment for microbes that must have air to live. If there are no microbes then there is no purification, and a milk sieve would do just as good work as any land, or even any artificial filter that cannot be supplied with air by some process or its equivalent (as some claim) of soda or similar chemicals. Arthur Turley, C.E., inspector of English sewage disposal works, states on page 5 of his report for 1890, that where irrigation is adopted, either alone or in combination with some precipitating process, the foreign matter in solution in the sewage is frequently increased by salts washed out from the soil. German chemists have given much attention to this disadvantage attendant on land filtration. The Teltower Sea, a lake near Berlin, was fouled by the effluent from the noted Berlin sewage irrigation works. Professor Muller reports that during nearly six months of the year no vegetation takes place on the land, and in hard frosty weather the land will not act properly, and the sewage must be stored up in tanks. Dry earth exerts a strong purifying influence on foccal matter, but has very little if any effect on the other ingredients contained in sewage which contain millions of dangerous bacteria. People go into ecstacies if they see a sewage irrigation land that appears to perform its work well, as they usually do for one year, and sometimes as much as four years, and the success is proclaimed far and wide.

It came to my knowledge that a sewage farm near Montreal was considered to be very near perfection, and on September 14th last I had the privilege of inspecting this farm at St. Lawrent College, St. Lawrent, a village near Montreal. The farm contained 11 acre or 6,000 square vards of land, raised by light soil to a level of over 20 inches above the natural ground line. The population served by this irrigation system was said to be 400 persons, the daily sewage was about 4,500 gallons, an average of 111 gallons per head, which would allow the very small amount of only three quarts of sewage to one square yard of land per day. This system cannot properly be called a sewage farm, it is really the land filtration system, because the soil is well underdrained by having a row of land tile pipes laid under the centre of each of the twelve bays or divisions which deliver the effluent after the sewage has passed through the land into the parish drain, this coupled with the fact that the land was raised with light porous soil makes it an artificial land filter. The surface appearance of the land .s that of a checker board having twelve trenches cut across from the distributing channel to the opposite side and to cross trenches, each trench being about 15 inches deep. The irrigation land and necessary appliances were said to have cost \$3,500, or an average of \$\$.75 per head of population. This is