

### Tar Macadam.

Among the consular reports recently published by the United States Department of State, is one on tar-macadam pavement in Hamilton, by U. S. Consul Shepard, residing in that city. Mr. Shepard says:

After years of experiment, this city is laying a pavement that for excellence, durability and cheapness is commended for examination to those in charge of similar work in the United States.

The possibility of making good roads at a reasonable cost has been demonstrated, and tests extending over a number of years on business streets prove that tarred macadam makes not only a smooth and solid roadway, but one that can be kept in perfect repair at nominal expense.

The first cost in this city, where limestone is abundant and near at hand, is from 70 to 86 cents per square yard; and the engineer estimates the cost of repairing on heavy-traffic streets at less than one cent per yard per year, while asphalt costs over three cents.

The addition of tar renders the roadway impervious to water, frost-proof in winter, and prevents mud and dust in the summer. It is easily repaired and does not require scraping, thus avoiding much wearing of the surface.

One block of tar macadam laid more than a year ago on a business street where there is heavy teaming shows no perceptible wear to-day. In residential streets, these pavements have been in use eight years without any repairs and are still in good condition.

The success of this method of road-making depends on care in its execution, as in the case of all composite work of this character, and I submit for the information of those interested the substance of an interview with the engineer of public works, Mr. E. G. Barrow, covering details of the processes in use here.

Either stone or cement curbing should be placed before beginning the roadway. Cement costs here fifty cents per linear foot and is six inches thick, twenty inches in depth, and laid on broken stone or gravel. Corners are rounded and an iron plate imbedded for protection. On business streets stone is preferable.

An essential in roadmaking is a hard and compact foundation, which can be secured only by the liberal use of heavy rollers, twelve to sixteen tons, while the base is being prepared.

The grade and camber should be so designed as to carry water off the surface quickly, and all earth above the sub-grade should be removed so as to conform to its level, twelve inches below the natural surface, which sub-grade should be thoroughly rolled and all soft spots filled with stone.

The foundation must be compact, a solid bed of stone not less than six inches in thickness. If the soil is of a spongy nature, large flat stones are preferred. All interstices should be filled with small

stone and gravel, well rolled in. Over this a coating of gravel should be rolled hard and then a layer of tar-saturated stone, not extending over two inches in diameter. These stones being mixed with boiling tar, eight to twelve imperial gallons to the cubic yard, must be thoroughly dried, either in the summer sun or by exposure on heated plates, until all moisture is expelled.

After a thorough rolling, another strata of tarred stone of the same dimensions and thickness is added, rolled and covered with a layer of gravel, and quarry chips, also mixed with tar, one inch in thickness, to be rolled down from three-fourths to one-half an inch. A top dressing of screenings is then added, and if a light color is desired it may be obtained by adding cement.

Most of the stone used here is machine crushed, but during the winter season, it is broken by hand labor and paid for per cord, to furnish employment in lieu of alms to the needy.

Limestone is used because it is abundant, but granite or flint stone would absorb less tar and stand more pressure and wear.

### Sewage Treatment.

The frequent change in opinion of engineers as to the best methods of treatment is a notable feature of the development of the last few years. Since the subject was first reported upon, the actual developments in scientific discovery have been considerable; yet it cannot be said that they are conclusive in any case. It is plain to either engineer or laymen that if a quantity of sewage be disseminated in a body of water large enough, the harmful elements will disappear. Equally obvious is the fact that if the sewage be spread on a sufficient area of land and be mixed with earth in large proportion, the natural agencies will operate to purify the sewage. Or, we can take a quantity of sewage and pass it through ample beds of coarse sand and have an effluent which is sufficiently clean to cause no public nuisance and to do no harm to fish-life. Or, we can go a step further and prepare artificial filtration beds of small sized coke and get a straining and aeration which may do better than the sand, if the area be well adjusted and sufficient rest is given between the applications. Or, it may be practicable to pass the sewage through filter-beds and by forcing air through filters get additional aeration, saving space and keeping up the efficiency of the filtering material.

Great sums of money have been spent upon chemical precipitation and treatment but this system has been generally abandoned on account of its expense and the difficulty of caring for the matter when precipitated, the sludge.

A method of treatment which is now receiving more attention from sanitarians and engineers than any other is that commonly known as the septic tank system, or purification by bacterial action. Here

the sewage is confined in large tanks from which air and light are excluded, and rapid bacterial action is developed, the natural processes of decay being enormously accelerated. The effect is not only to take from the sewage those parts which would cause a nuisance, but to actually consume a large portion of the solids. The discharge from the tank is passed through coke filter beds, and it is claimed that the experiments have shown the final effluent to be free from deleterious properties. Tests have now been in progress for some time, especially in England, and the reports this year are increasingly favorable, not only as to effectiveness, but also as to economy. It is yet too early to decide definitely as to the merits of this method, but it appears to be along the lines of natural development, and it seems certain to provide one new method of meeting special cases.

Nearly all of these systems of treatment are applicable with economy and success only to house-sewage, and here is encountered one of the chief difficulties of providing suitable treatment locally, as the combined system of sewers which includes surface drainage so floods the fields or the machinery as to destroy the efficiency of the system.

Besides the more intricate methods of treatment, it has been found advisable in many cases to discharge crude sewage with the out-going tides; or to provide tanks where, by slow flowage, the sewage would deposit solids, these to be removed by mechanical means, only fluids escaping. The views of engineers are almost as varied as their number, but it is safe to say that the wisest and best of their profession hesitate to prescribe any single remedy until elaborate investigation, and that they are then often inclined to use more than one of the methods, all depending upon the necessities of the individual case.

Constant improvements and sometimes radical changes have been necessary in all the large works, and this applies to London, Manchester, Paris and Berlin, and scores of other European cities in some degree, as well as to cities of this country. And in all the necessity for the more complete purification of waste is becoming generally recognized. The great difficulty in this country has been to awaken the public to the necessity of efficient work, and until there is a fair realization of the impossibility of carrying away waste without expending money in the carriage and disposal, the requisite health measures will be delayed. The city of Chicago is now spending the last of thirty two millions of dollars in an effort to remedy its foul conditions, and while the system adopted has been criticized, the courage of the public in pursuing a remedy at so great a cost commands admiration.

Mr. G. L. Hobson, county treasurer of Welland, died at his home in the town of Welland on Aug. 31st last, aged 59 years.