CARLISLE BRIDGE, DUBLIN.

CARLISLE BRIDGE occupies in Dublin a position analogous to that occupied by London Bridge in regard to metropolitan traffic—that is to say, Carlisle Bridge is the furthest down the river, and over it passes by far the greater part of the traffic between the north and south side of the city. The bridge has long been too small for its work, and it is now proposed to rebuild and widen it, according to plans prepared by Mr. Bindon Blood Stoney, M.I.C.E., engineer to the Dublin Corporation. We give an elevation thereof. The principal work consists in extending the piers and abutments of the present bridge, removing the old superstructure wing-walls, and quays, lowering and altering the approaches, and building a new and wide superstructure, with wing-walls and quays, on a portion of the old foundations, and on the extended piers, abutments, and wing-walls. The new work, east and west of the present bridge, is in the specification called the side additions.—*Engineer*.

HEALTH AND SEWAGE OF TOWNS.

THE PRACTICAL EXPERIENCE OF THE DRY SYSTEM.

By ALFRED CARPENTER, M.D. (London), C.S.S.

It is well-known that Croydon is drained in the ordinary way; that is, more or less imperfectly, but there are small areas which are not sewered at all. Among these is the hamlet of Waddon; it lies between Beddington and the southwestern part of the parish of Croydon. It is a district in which the water line is constantly changing, according to the requirements of the miller who works the water mill, which has existed from time immemorial at the confluence of the several small streams which give rise to the River Wandle. The occupiers of some of the fields close to the hamlet have also the right to dam up the Wandle, and use it as a sheepwash, and also the right to irrigate the pastures themselves. The result of the maintenance of these rights is that the subsoil is generally waterlogged, water existing within a few inches of the surface of the ground. Notwithstanding this state of things, a number of cottages were built on a part of this land close to the left bank of the principal stream of the Wandle. When the plans were first deposited by the speculators who proposed to erect these houses, there was no law by which they could be compelled

with the owners that they should erect the closets, but that the Croydon Local Board should collect the refuse and supply the hoppers with dry ashes, and the pails with sawdust, as often as should be necessary. The whole of the arrangements were carried out, and have since been superintended by Mr. Mitchell, the sanitary inspector of the Croydon Local Board of Health, and I learn from him the following results: He states that, whereas serious illness always prevailed in those houses before the erection of the closets, there has been very little since, and scarcely any of that class of disease which formerly visited them; that the houses, instead of being pest-houses to the neighborhood, are now perfectly healthy. It is also stated in Dr. Buchanan's report upon the epidemic of fever, which visited Croydon in 1875, that these cottages at Waddon altogether escaped. Mr. Mitchell also states in a written report of last week's date:

"That he had had no complaints in writing at all. That there were a few verbal complaints at first, in consequence of the trouble that occupiers were put to whilst the workmen were about; but that they soon settled down, and that when they got used to the closets they expressed great pleasure at the change, stating that they were now free from the offensive smells to which they had been previously subjected, and that they now suffered no inconvenience, except when the men were late in removing the contents of (changing) the tubs."

It ought to be stated that almost frantic efforts were made to rouse the people against the use of the closets, and to compel the local authorities to sewer the district, and that a strong antagonistic feeling had to be contended against when they were first introduced.

The closet consists of a hopper at the back, large enough to receive a week's supply of earth or ashes (we use the latter from the siftings of the dust heap). By means of an exceedingly simple arrangement, the hopper discharges the ashes upon the solid fæces, as the user rises from the closet. The pail is placed beneath the seat. It consists of half a petroleum cask, well bound, with an upright diaphragm, which separates the anterior part of the pail from the posterior, the former being arranged to receive the urine, and is charged with sawdust. The pails are changed weekly, between five and six in the morning. The duty of collection is performed by one of the dustmen, who collects town refuse during the later hours of the day. The total cost for two years and a quarter, that is, to the end of March, 1877, has been as follows:

Wages of man and boy.....	£	s.	d.
Horse and cart (use of).....	47	4	6
Sawdust.....	8	9	0
Total cost for 118 weeks' collection	70	5	6

That is, £70 5s. 6d. appears in the accounts of the Local Board as the cost which the ratepayers have incurred during the last two and a half years in collecting and replacing the pails at Waddon. Against this sum there is a set-off in the value of the material collected. This is mixed with other refuse at the filtering house, and is sold with that refuse to market gardeners at 2s. 6d. a yard. It is probably worth rather more than that, but, not having been kept separate, its practical value is not known. About a yard and a half is collected every week, which reduces the actual cost by 3s. 9d., or to 8s. 3d. per week instead of 12s., which would appear to be the cost according to the published accounts. Twenty closets were erected in 1874, and two have been added since; thus 22 houses, occupied by 122 persons, have been provided for, the cost being £1 8s. 5d. per house, or 5s. 1½d. per person per annum; or, if we allow the value of the produce to be deducted, the cost is reduced to 3s. 6½d. per person, or to a trifle under £1 per house per annum. Of course, the experience of a small district puts the expense at an outside amount, and if, instead of 22 houses, there had been 220, the expense would be reduced by one half. I am inclined to think that 10s. per house would amply cover the cost of the collection of excreta in a country village of 200 houses, and if the average rateable value of the houses in such a village is put at £15, it would entail a rate of 9d. in the pound to provide for the removal of excreta by a dry earth plan. At the same time, there would be no debt incurred, and no mortgage of the rates necessary. I simply submit the facts for the consideration of the Conference.

It may be asked in what way the slops are provided for at the houses to which I have remained. When the closets were fixed, the cesspools were pumped out and the concrete broken down and communications between the closet and yard broken off, the waste pipes from the sinks were made to deliver upon a trapped grating in the yard which led by a drain into the old cesspool. From the cesspool, a filtering bed of loose stones and gravel, in a trench from where the drain pipes had been taken up, was provided, and this filtering bed led off to the River Wandle. Whenever the level of the water in the bed of the Wandle is below the level of this trench, it draws off into the Wandle without leaving the least trace of defilement or pollution. When the bed of the Wandle is full, the subsoil is necessarily filled with an impure water. If the Wandle was never dammed up, there would

be no difficulty whatever on the score of the slop water; in the case in point and in most cases, if one of Field's flush tanks could be used, I see no reason whatever to suppose that any evil would arise at all, the only necessity being that houses should not be allowed to be erected on land which is water-logged.

For small blocks of houses at a long distance from any system of sewers, or in thinly peopled districts, I can confidently recommend some such plan as that of Moser's as amply sufficient to prevent defilement of subsoil by sewage, and enough to provide for the removal of nuisance. But such arrangements must be under the control of a local authority, who must see that the proper removals are made at proper times.—*Journal of the Society of Arts*.

IMPORTANT DITCH ENTERPRISE.

THE Nevada Transcript says: John Cashin, J. S. Thompson, J. D. Sweeney, M. M. Richardson, and J. H. Thomson, have filed a document in the County Recorder's office, setting forth that they have located and appropriated fifty thousand inches of water, running in Truckee River, measured under a four-inch pressure. They take it from the river at a point called Camp 20, in this county, at the dam of the "People's Ice Company." The purpose for which this water location is made is to convey the water of the Truckee River in a flume and ditches into Sierra County, in this State, and into Washoe County, in the State of Nevada, for floating wood, timber, and lumber; and more particularly for irrigating land. The flume and ditches will extend to Spanish Spring Valley, in Washoe County. The flume at the initial point will be constructed twelve feet wide on the bottom and four feet high on the sides, with two and one-half inches grade to the rod, and will be continued on a grade that will be necessary to convey the water to the agricultural lands lying north and south of the line of the flumes and ditches. The ditches and flumes will be of sufficient capacity to carry fifty thousand inches of water to the above-named point. They claim the right of way for their flumes and ditches over all lands lying along the line to the points above mentioned. The distance is about thirty miles. We understand the main idea in contemplation of this enterprise is to furnish water for irrigating the lands in that vicinity. There are thousands of acres there that are of no use to anybody in their present state, it being utterly impossible to utilize it without water, and the movement is projected to give it a

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to provide a dry basement. Application was made, by the builders to the local authority, to sewer that district at the public expense, but the Local Board declined to do it except at the expense of the owners. It was contended by the writer that the ratepayers of the parish ought not to be called upon to turn a swamp into building land for the benefit of speculators. Nevertheless, the houses were built, and immediately occupied by a swarm of poor. The result, which was predicted when the plans were deposited with the Local Board, soon came to pass. The inhabitants suffered continually from the effects of enthetic disease. Scarlatina, diphtheria, and fever were constant visitors. The neighbors then began to complain; many deaths occurred. The stench from the continually overflowing cesspools was plainly perceptible in the public road, and great pressure was brought to bear upon the local authorities to compel them to sewer the district, at an expense almost equal to the value of the cottages themselves. But it appeared to the writer that to put sewers into such a district would be a sanitary mistake, at least, one half of the time they would be waterlogged, and be the means of retaining mischief in close proximity to the houses, instead of conveying it away. It appeared that, before sewerage the district, the water-line should be permanently lowered, that the owners should give up the right to flood the neighborhood, and thus make the land fit for building purposes, before the local authority provided sewers for the sewage. There was also another consideration in the case. The sewage from these cottages would have to be conveyed to Beddington sewage farm. There would then be a 12 inch sewer, constantly discharging subsoil water instead of sewage upon a farm which already receives more subsoil water than it is entitled to. The owners refused to do this duty, and it was left to the sanitary committee of the Croydon Local Board of Health to devise a remedy for the insanitary state of the hamlet, which state the law had allowed to grow up close to our own noses, and in spite of our protests. The year 1874 was a very fatal one to the inhabitants of the cottages; the owners did not—indeed, they could not—empty the cesspools which had been constructed, and it was evident that something must be done. The property had changed hands, and the new owners were willing to do what the Sanitary Committee recommended. The writer had been much struck with the simplicity and cheapness of Moser's closets, as exhibited at the Social Science Congress at Glasgow, in 1874, and ultimately 20 closets were erected by Mr. Moser, at a cost to the owners of something under £3 per closet. They were completed December 24th, 1874. The cottages are in a block close to the road, and about one third of a mile from the outfall sewer, near to which the town refuse of the Croydon district is conveyed. It was agreed

good and permanent value. The land can now be bought of the Government for \$1.25 per acre, and when the enterprise is carried through it is claimed it will be worth \$5 or \$6, and perhaps more. An illustration of that fact is shown in the case of the inauguration of the same kind of an enterprise between Reno and Steamboat Springs, where, previous to water being carried there in flumes, the land was worthless; but now it commands a high value, from the fact that at that point any kind of feed for animals can be raised upon it. As soon as the company get the matter properly arranged, they will commence the building of the flumes and ditches. They expect to get at it this season.

EXTINCTION OF FIRES.

A SERIES of experiments in connection with the extinction of fires were carried out recently, by permission of the Commissioners of Woods and Forests, upon the vacant space of ground at the bottom of Whitehall Place, London. The improved fire exterminators, "Fire Queen" and "Double Express," are not charged until the moment arrives for using them, when by a blow upon the brass cap at their summit a bottle containing acid is broken, and a volume of carbonic acid gas, with a pressure of from 90 lbs. to 120 lbs. to the square inch, is generated. On the apparatus being emptied it can be speedily recharged by means of a fresh bottle of acid and a pocket of bicarbonate of soda. An open stockade of timber and tar barrels loosely packed together, about eight feet in height and twenty in length, having been liberally sprinkled with tar, was then set on fire. In two minutes it was blazing fiercely from end to end, and throwing out an amount of heat which drove all present to some distance. Two "Fire Queens" were brought to bear upon it, and in the space of a minute and a quarter the flames were utterly subdued. The woodwork having been recoated with naphtha was again ignited, and burnt, if possible, more fiercely than before, when the "Double Express" was brought to bear upon it with similarly successful results. The "Double Express," which has been expressly designed for use at railway stations, factories, and similar large buildings, present the peculiarity that one of the two cylinders composing it can be charged whilst the other is discharging its contents, by which means an uninterrupted flow of liquid can be poured upon the fire. The mask and goggles, fitted with Professor Tyndall's smoke respirator, and also with an air tube to enable the wearer to advance into the mines and other localities filled with noxious vapor, were also shown, and their working explained. Finally, the working of a new patent spiral descender, forming a portable self-acting fire escape, was ex-