NEW INVENTIONS.

THE SHONE HYDRO-PNEUMATIC SYSTEM OF SEWERAGE.

The progress made in this country and abroad in exploiting this system has induced us to try to explain its principles and practical usefulness to sanitary authorities and others interested in works of drainage and sewerage.

On the Shone system any pressure may be obtained, and the whole of our English water-carried sewage can be dealt with without any alteration in the present most approved methods of draining and ventilating house drains and sewers. The ideal drawing or illustration, Fig 1, will help to explain Mr. Shone's system if applied in its entirety to a town.

It will be seen that under the centre of a street, where, as in this case, four streets meet, the apparatus called the "Hydro-pneumatic Ejector" is fixed, low enough beneath the surface to admit of the gravitation sewers—which carry the sewage to the apparatus—being laid at the gradient necessary to enable the sewage to flow freely through them at self-cleansing velocities. These sewers, besides being laid at suitably steep gradients, are short in length and of small bore, permitting the minimum as well as the maximum volumes of sewage to reach the ejector station within a few minutes after its escape from the houses producing it. Besides thus creating essential hydraulic conditions for the sewage to flow, it will be seen that automatic flush-tanks are fixed at the heads of each of the main sewers carrying sewage to the ejectors. These are adjusted in capacity to suit the sizes and lengths of the sewers to be flushed. The working of these is regulated so as to insure their being discharged once or twice daily. The illustration also shows that at the bottom of the soil-pipe, or at some other place where all the drains of a building or buildings could be made to gravitate and converge, a Shone's house-sewage ejector is placed. The inlet and outlet pipes of the apparatus are sufficiently large to permit everything that will gravitate through the soil-pipes and drains to flow freely into it and out of it. Placed in the manner indicated by the drawing, it serves the purpose of a sewage-gas trap and automatic flush-tank combined.

By the use of this apparatus the whole of the waste fluids discharged from houses are temporarily arrested and collected, until the volume equals, say, from 50 to 100 gallons; when it is full, the 50 or 100 gallons is discharged into the main drain of the house, in from 30 to 40 seconds; and this sudden inrush of fresh sewage drives out of the main drain the air contained in it, and at the same of the apparatus when empty has a deep sewage-water seal, to prevent sewage gas which may be formed, either in the main drain of the house or in the public sewer, escaping to the soil-pipes and drains which carry the sewage into the apparatus. But this apparatus is not necessary at every house. Where houses abut closely upon the streets, as per illustration Fig. 1, the lengths of the drains are too short to require more flushing than can be had in connection with lavatories, baths, and water-closets. But where the houses to which the apparatus is attached are situated over, say, 100 feet from the public sewer—and suburban houses very often are so situated—then the use of the apparatus becomes a necessity, for the reason that the sewage discharged into the main drains of such houses are not sufficient to keep them effectively flushed and self-cleansing. This apparatus may of course be used with advantage also in connection with ordinary gravitation sewerage, indeed it is manifest that the fouler the public
sewerage system of a town is, the greater is the necessity for the use of such an apparatus.

It will thus be seen that provision is made in the Shone system for the construction and maintenance of (1) house-drains, and (2) of public sewers in a self-cleansing condition.

After providing the best practical hydraulic conditions for the delivery of the sewage when it is fresh and harmless to the sewer station, the hydro-pneumatic apparatus in these stations automatically receives and ejects it into sealed iron pipes, whence it is conducted to the outfall.

The ejector stations are distributed over the town or district to be drained or sewered; each ejector station receives the sewage of as large a number of houses as can be drained to it without causing the death of the sewers to be excessive and costly.

By dividing towns into sections in this way, each division contains a separate and independent system; it is always full of sewage right away from the ejectors to the outfall; and the iron delivery pipe is common to all the ejectors of the system.

There are no manholes or ventilators on this iron outfall sewer; subsoil water cannot break into it, neither can water from the rainbeams.

The systematic plan adopted for bringing the sewage to the ejectors insures the quick passage of it to each of the several stations, so that when it arrives at the ejector stations it is fresh sewage, and in that condition it will be ejected into and through the iron sewer to the outfall. The pneumatic or compressed air power used to eject the sewage is produced at some central or other convenient and cheap out-of-the-way site, and where the buildings containing the air-compressing machinery would not be objectionable in any way.

In this respect the air-compressing station resembles somewhat a coal-gas producing works.

Gas, as is well known, is produced at the gas works and stored in large gasometers, whence it is conducted to the consumers through small iron pipes laid under the streets of the town. Compressed air power is produced by the action of a pump which sucks atmospheric air into it by one stroke, and compresses it and expels it into an air receiver by the return stroke.

The atmospheric air thus compressed and stored in the air-receiver is conducted through small iron pipes laid under the streets to the several ejectors within the village, suburb, or town drained on the Shone system.

The ejector station in the illustration, Fig. 1, shows how all the several sewers and the iron pipe carrying the sewage to the outfall, which in this instance is supposed to be the sea, are laid, in part at least, in the same trench. When they are shown as being laid in separate trenches, the assumption is that they are not continuous, as, of course, the air-pipes take the shortest and straightest line between the several ejector stations and the air-compressing station.

The illustration also indicates that there are other ejector stations besides the one represented, and that they communicate with the same air and sewage pipes which are shown on the drawing.

The system adapts itself readily and inexpensively to existing and new growing districts, as all that is required to develop it in any place is to extend the air-pipes into the centre of new districts, and there erect ejector stations, which would effectually drain the new districts as they grow.

It is to be understood that the system is applied extensively to separate buildings in England and America for draining cellars and basements; and ejectors have been made for dealing with as little as 20 and as much as 9,000 gallons per minute.

In Rangoon, Burmah, 25 separate sewage-receiving and ejecting stations, and one fresh water receiving and ejecting station have been established. The latter drives the water supply into the city, and the former drives it, after it has been used and converted into sewage, out of the town.

LAW REPORTS.

BIRMINGHAM CORPORATION AND SEWAGE POLLUTION.

The Birmingham Corporation were again the complainants before the judge of the West Bromwich County Court (W. D. Griffith, Esq.) on Thursday July 24, on this occasion against the Smethwick Local Board, under the Rivers Pollution Act, for not complying with an order of the court made on August 2, 1889, restraining the corporation of Edgbaston, under which the claim extended was from May 2 to June 9, 1890, embracing thirty-eight days, and the penalties amounted in the aggregate to about £1,900.

Mr. Barham (from the Town Clerk's Office) appeared for the Corporation, and Mr. W. Shakespeare defended.

Mr. Barham stated that the proceedings to which his present application referred were commenced so far back as the month of November, 1888, but had been allowed to stand over from time to time on the understanding that the Smethwick Local Board would carry out the necessary works to prevent the pollution complained of. Up to the present time, however, the Smethwick Board had practically done nothing, and the pollution was just as bad now as it was some years ago; and they charged the defendant with wilfully and persistently refusing to carry out the order of the court.

Mr. Spooner, surveyor to the city of Birmingham, stated that the area of the Smethwick district was 1,889 acres. Exceeding three or four connections with the city sewers, there was no proper drainage for the 332 acres of this area which drained through West Bromwich, and the sewage found its way into the water-courses. The condition of Hockley Brook was very bad; he was not aware of any pollution going into it either from Handsworth or Birmingham.

By Mr. Shakespeare: There would be six connections with Birmingham altogether and four of these were already made, three only being in actual use. It was not intended that Smethwick should have any outfall works of its own, and except the sewage passing through the river, all would pass through the joint sewer at Handsworth. When the intercepting mains were completed it would effectually prevent the pollution complained of. He thought they could complete the work well within twelve months.

Mr. Alfred Hill, medical officer for Birmingham, deposed that certain samples of water collected from Hockley Brook, and analysed by him, showed a large admixture of sewage.

Mr. Shakespeare said that what Birmingham now complained of the Smethwick Local Board for being, that corporation at one time did very largely its work before Birmingham completed their present system of sewerage they discharged a considerable portion of it into Hockley Brook, and it would take perhaps two or three generations before the brook course would be pure again. The question for the court to decide was how much time ought to be given to Smethwick Local Board to complete their system of sewerage. The district contained about 1,880 acres and a population of about 30,000. The Local Board had in conjunction with Handsworth constructed a joint sewer, which would take the whole of the sewage of Smethwick to Salford, and the fact that