RECENT SEWER CONSTRUCTION.

The following description of this recently executed work is abstracted from the report of the engineer, Mr. Isaac Shaw, under whose supervision the work was done, our illustrations being reproduced from the same source. The plans were prepared by Mr. John Phillips, S.E., of London. In 1839 Sir Charles Barry laid down, under the middle of the Houses of Parliament, from north to south, a large, nearly flat-bottomed brick sewer, which discharged into a slanting constructed sewer in Abingdon Street, near the Victoria Tower.

This sewer, owing to its bad form, excessive size, little fall, and absence of any means for flushing it, accumulated a large amount of sewage deposit, the gaseous emanations from which continually polluted the air of the Palace. In 1846 the stenches from the Palace became so bad that Sir Charles Barry consulted Mr. John Phillips, C.E., who was then the Chief Surveyor to the Westminster Commissioners of Sewers, with a view to its improvement. Mr. Phillips, after examining the sewer, recommended that a narrow, deeply cut and very well steeped, with a reversed fall, should be substituted for the old invert, and that it should be continued northward, across the Speaker's Green, into the outlet of a sewer in Bridge Street, which latter he found to be about five feet lower than the sewer in Abingdon Street.

Sir Charles Barry not only adopted and carried out these recommendations, but the increased depth enabled him to construct two main branch drains from near the lower end of the new portion of the sewer, for draining the east and west sides of the Palace at a much lower level than they were originally.

By the better gradient thus obtained, and by the narrow and deeply cut invert put in, the sewer was altered, supplemented with ample flushing power, and, by its improved condition for a quarter of a century, and twelve or thirteen years ago.

At that time, about 1872, the Metropolitan low-level sewer—seven feet nine inches in diameter—was put down through Westminster, and the Palace sewer was connected with it; its bottom at the junction being about twenty-one inches above the bottom of the Metropolitan low-level sewer.

Ever since this work was done there has been steady, in dry weather, from three feet six inches to four feet in depth of sewage flowing on the bottom of the Metropolitan low-level sewer, and this created a constant head of sewage against the Palace sewer, when converting it into a creek, for a length of about two hundred feet, containing from one foot nine inches to two feet three inches in depth of nearly stagnant sewage, which was always present upon the bottom of the Palace sewer.

But besides this, in wet weather the Metropolitan sewer was not only always filled with sewage-water, but sometimes this water has risen to ten feet above the crown of the Metropolitan sewer, or thirteen feet above ordnance datum. During wet weather, therefore, the Palace sewer, and its main branch drains, have been filled with sewage and rain-water, which could not be discharged as the flood-water contained in the Metropolitan low-level sewer had subsided, by being cleared out by the pumps at Abbey Mills, Bow, and by running it off through the sluices at Blackfriars and elsewhere into the Thames.

Hence, for twelve or thirteen years past, the Palace sewer, as well as its main branch drains, have been periodically converted into a series of sewage-reservoirs; and from these the sewage-water, as it accumulated and filled them, pressed out the foul-gases contained within them, up the various contributing drains into the Palace. This discharge of sewage gas into the Palace has been going on more particularly at night time, during the sessions of Parliament, when the gas has been burning throughout the Palace, and when the waste hot water and steam from the warming and ventilating apparatus in the Palace were discharged into the drains and sewers, and fermented the sewage lying therein.

The unpleasant effects, caused partly by the Metropolitan low-level sewer, and partly by the sewer and drains under the Palace, as already described, became so intolerable that Parliament had no alternative but to refer the subject to a committee of the House of Commons.

But until the first session of Parliament in 1866 no remedy was found for the evils complained of, which had become so pronounced as to cause the House of Commons to suspend its sitting on one occasion.

In the early part of 1866 a committee was appointed, Sir Henry B. Reeve, P.R.S., being the Chairman. One of the members, Mr. L. H. Isaac's, made a personal examination of the interior of the main sewer under the Palace, from the Victoria Tower to the point of discharge at the Speaker's Green; and, having regard to the then state of the main sewer (which is exemplified by Fig. 22), Plate 1), this was a disagreeable, not to say courageous, work to undertake.

He came to the conclusion that the smells so much complained of, and so frequently experienced within the Palace, were mainly due to the faulty sewers and drains under the Palace, and more especially to the connection of the main sewer with the Metropolitan low-level sewer running through Westminster.

Mr. John Phillips, sanitary engineer, also made examinations of the sewer, and some of the branch drains, under the Palace, and endorsed the views of Mr. Isaac in regard to the faulty character of the same. He subsequently submitted to the committee a plan for improving the main sewer arrangement of the Palace, and rendering them perfectly independent of the Metropolitan low-level sewer as a means of discharge by gravitation.

The committee, after due consideration of the subject in all its bearings, recommended to Parliament that the plan, as proposed by Mr. Phillips, on the Shone-Hydro-Pneumatic System, should be adopted; and their recommendations have been substantially carried into effect.
The ejectors are always receiving fresh compressed atmospheric air when the sewage is being expelled out of them, and the surplus of this air—i.e., the volume of air which exerts a pressure superior to that of the atmosphere—and which is incessant—after each charge of sewage has been ejected, escapes through the exhaust-pipe of the automatic gear into a pipe which conveys it to the ventilating shaft in the clock-tower, whence it escapes into the atmosphere.

The ejectors are self-acting, and work only when they have work to do. They are emptied in about half a minute, but they take no dry weather, when Parliament is not in session, from ten to fifteen minutes to fill.

The compressed air required to expel the sewage and rainfall is supplied by air-compressors, driven by Atkinson’s patent differential engines. There are four of these (of four horse-power each) situated in the basement of the Palace, about 60 feet from the ejector-station, illustrated in Fig. 5.

Figures 4 and 5 are a plan and section of the pneumatic ejector station, and Figs. 10 and 11 a plan and section of the air-compressing station.

The minimum lift for the Palace ejectors is twelve feet, and the maximum lift will probably never exceed twenty feet.

By the aid of Kaiser’s Counter, attached to the ejectors, they become sewage-meters, giving accurately the quantity of sewage in dry weather, and of sewage and rainfall combined during periods of wet weather.

From observations already made since the ejectors have been at work, it is clear that one gas-engine air-compressor and one ejector will deal with more than the whole of the largest quantity of sewage flowing from the Houses of Parliament at any one minute of time, even though that sewage should be supplemented by an amount of water equal to one inch and more of rain falling upon the entire area of the Palace and grounds to twenty-four hours.

When these are insufficient, during periods of extraordinary excessive rainfall, there is a float within the sewage manhole, adjacent to the ejector-chamber, which will rise and fall with the sewage and rainfall, and will actuate one of Mr. Julius Sax’s automatic electrical tidal-water gauges.

This is fixed within the ejector-chamber, and a duplicate of it is also fixed in the gas-engine room, both being operated simultaneously by the float.

These instruments indicate the exact level, in inches, of the water in the sewage manholes from which the ejectors are supplied.

The present one engine overcomes the electrical apparatus rings a bell within the ejector-chamber, and in the
The ventilation of the new 12-inch main sewer is effected by admitting fresh air into the subway which runs down the basement of the House of Parliament into direct communication with the ejector chamber, and allowing it to proceed, first, along that subway into the ejector chamber; secondly, through the ejector chamber into an air-duct at the top of the eastern end thereof; and, thirdly, along this air-duct into the sewage mainhole.

The air is made to pass out of the sewage mainhole partly into the main 12-inch sewer and partly through the rectangular air-opening, which communicates with the subway above the main sewer.

That portion of the air which passes into the 12-inch sewer proceeds directly to the town, leaving the Victoria Tower, but, before diverging from the line of the main sewer, it joins the air-current which travels from the bed of the sewer. Both currents therefore go together—from the point of divergence in the new 12-inch main sewer—and out of the Victoria Tower, along with the stream of vitiated atmosphere proceeding from the Palace.

That portion of the air which passes through the rectangular opening in the sewage mainhole into the old sewer travels along that subway for a short distance only, and then diverges from the right-hand side that is admitted at the head of the old sewer subway (to be ventilated), and proceeds along an air-duct direct to the fence at the base of the clock-tower.

The air that ventilates the smallest 9-inch sewer is drawn from the upper end of that sewer to the clock-tower furnace.

The consumption of cannell coal gas, when one engine is running and compressing air to about 10 pounds per square inch continues for twenty-four hours, is about 2,000 cubic feet, which costs—reckoning gas at the price paid for it—a gain of 3s. 6d. per day for 9-inch. (For 150 pounds per day, $4.50.)