Fourth—After the expiration of the three years referred to in clause above, and provided that the Subway is in operation, the Government to pay two hundred thousand dollars ($200,000) per annum for fifty years in quarterly payments to the Company.

Fifth—The Government to allow all material used in the construction of the works proposed to come into the country duty free during the construction

Enclosed herewith is a reprint from London *Engineering* of a description of the Southwark Subway, which, since this was printed has obtained an Extension Act to Stockwell.

I remain,

Your obed ent servant,

(Signed) VERNON SMITH.

May, 10th 1887.

Here is the reprint from *Engineering*, showing the plans and diagrams of this sub-way referred to, showing the River Thames with the crossing, and also a diagram of the work, with the material and machinery used in constructing it. The description of the work is as follows :

"Before we go further into the question of the way in which the traffic is to be worked, it will be well to describe what the subway is, and how it is being laid. The route, as we have already stated, extends from the city to the Swan at Stockwell. This distance is 3 1-6 miles and for the first half of it Parliamentary powers have already been obtained. The Bill for the remainder has passed the House of Commons, and unless something unforseen should happen in the Lords, will become law this session. The first part of the route is shown on the plan below, and for the benefit of those not acquainted with London, we may state that the remainder is nearly straight, and is practically level. It runs down a wide road with broad footpaths often edged with gardens, or with shops built out from old fashioned houses. The up and down lines of the subway are absolutely distinct, each being carried in an iron tunnel. These two tunnels do not necessarily run side by side; as shown in the plan they commence together at the terminal station in King William street, but the down line falls more rapidly than the other, and before the Swan lane is reached, it has taken up a position exactly below the upper tunnel and removed from it by some five feet. This arrangement is adopted because Swan lane is too narrow to allow the two tunnels to run down it side by side without encroaching on the adjacent private property. At the bottom of Swan lane the tunnels enter the river bed, the upper one fifteen feet below the surface, and then the lower deviates a little to the right until the two are side by side. At the opposite bank of the river there is no convenient road for the subway to follow, and it therefore crosses under Hibernia Wharf into Borough High Strait, after which the tunnels maintain their relative positions. In plan they are side by side with about five feet intervening between them, but in section one is at a lower level than the other, in order to reduce the standing expenses at the station, by rendering it possible to work them entirely from one side. The passengers from the lower platform will pass under the other, and will ascend by a short tramp to the waiting room from which the lifts and staircases start. Thus the entire premises will be confined to one side of the street.

Each tunnel is 10 feet in diameter and is formed of rings of segments bolted together by internal flanges. Each ring is 1 foot 7 inches long, and is composed of six equal segments, and a short key segment with parallel ends. The flanges are 3½ inches deep by 1¼ inch thick, and are bolted together by ⅞ inch bolt. The circumferential joints are made by tarred rope and cement, and the longitudinal joints by pine strips. The method of erection is almost as simple as the tunnel itself. At the head of the subway, supposing a short length of tunnel to be already in place in the clay which underlies the River Thames, there is steel shield consisting of a cylinder six feet long and of sufficient diameter to slide easily over the portion of the subway already bolted together. The forward end of the cylinder has a cutting edge, while about midway of its length there is a bulkhead having a door in in it. Through this aperture the workmen move a part of the clay in front, cutting out a small chamber considerably less in diameter than the shield. When this has been done the shield is forced forward by six hydraulic rams fed by two hand pumps. The hydraulic cylinders are bolted to the shield, while the ram heads abut against the last ring of the completed tunnel. The cutting edge clears out an exact circle in the clay, forcing the material into the space prepared for its reception, from which it is dug out and loaded through the door into skeps for removal. As the shield moves forward it leaves at its rear an annular space, of about an inch, between the iron and the surrounding clay, and this is immediately filled with grouting to prevent any subsidence either of the tunnel or of the ground. The method by which this is accomplished is very ingenious, and is due to Mr. J. H. Greathead, the engineer-in-chief to the undertaking. The grouting, made of blue lias lime and water, is mixed in a wrought-iron vessel, provided with paddles which can be worked from the outside. The vessel is closed, and compressed air, at a pressure of thirty to forty pounds per square inch, is admitted to it, while the paddles are kept at work. By means of a hose pipe ending in a nozzle, the grouting is forced through holes let in the iron lining into the space between it and the