of water, which flows down the "dip planes" of the strata confined by the impermeable layers above and below. Such water flows with the "head," due to the difference of vertical level of the "area of outcrop" to that of the "area of discharge," less the frictional resistance of the fragments of the rock through which it passes. When the facilities for the discharge of a volume are less than the quantity capable of being received, the porous rock will be full up to the permeable layer above, which is invariably the case when all outlet is stopped by faults throwing in impermeable strata. Such porous rocks may be regarded as underground conduits, the depth of which is the thickness of the bed, the width of which is the extent of the outcrop or horizontal strata of its bed, and the inclination of which is the dip of the strata. When the outlet is blocked the saturation level remains unchanged, and unless water is artificially removed, so as to provide space for a fresh supply, no additional water can be added to the existing store. In wells and borings of the artesian class, in which the porous rocks absorb their supply in a distant area, the water rises to the height of the intake less loss from friction, and forms the artesian rest-level. The inclination of the water between several wells of this class gives the artesian gradient; heavy pumping may produce an "artesian pumping level," but not a true "cone of depression."

Pervious or permeable formations, by gradually absorbing waters which fall on the surface, and slowly percolate through them, act at once as filter-beds and as reservoirs, the capacity of which is limited by the area of absorption and the thickness of the pervious bed. When rain falls upon a pervious rock overlying impermeable deposits, the water-line is generally near the surface, and forms the "plane of saturation" which is found to be slightly above that of the deepest valley intersecting the water-bearing rock, rising toward the centre of the hill, varying within certain limits, being governed by the amount of previous rainfall. When wells are sunk into it, and excessive pumping takes place, the plane of saturation is artifically and locally lowered, and is known as the pumping level. After a few hours' cessation of pumping, the water rises to its original level, or nearly so; the point so reached is the "rest level." The difference between the "rest level" and the pumping level in some wells is as much as 100 feet. The area of exhaustion resembles an inverted cone, the apex of which rests on the point at which the pumps abstract the water, and the base of which is a circle at the surface around the well. If over-pumping takes place, the "cone of exhaustion" has to be enlarged; its vertical height increased by lowering the pumps to a lower level, and is followed by a larger concentric circle being added to the central one at the surface. At each successive lowering of the pumps a larger concentric circle of contribution is added to the original area of abstraction. Wells of this class are not artesian, and the water in them does not rise at pressure. In porous rocks of great thickness, the plane of saturation is often at a considerable depth from the surface, the annual rainfall absorbed being balanced by the springs running off at the lowest level, but little being collected from the floods, the water passing over the outcrop of the porous strata too quickly to sink into the strata. In these cases it would be possible to raise the height of the saturation level, increase the storage powers of the rock and the yield of the springs, by sinking "dumb-wells" into the porous strata, and draining storm water channels into them; in this manner the "floods" of wet periods might be collected and gradually distributed as "springs" during periods of drought, and the "dry-weather flow" of the streams increased.

(*To be continued.*)

For The Canadian Engineer.

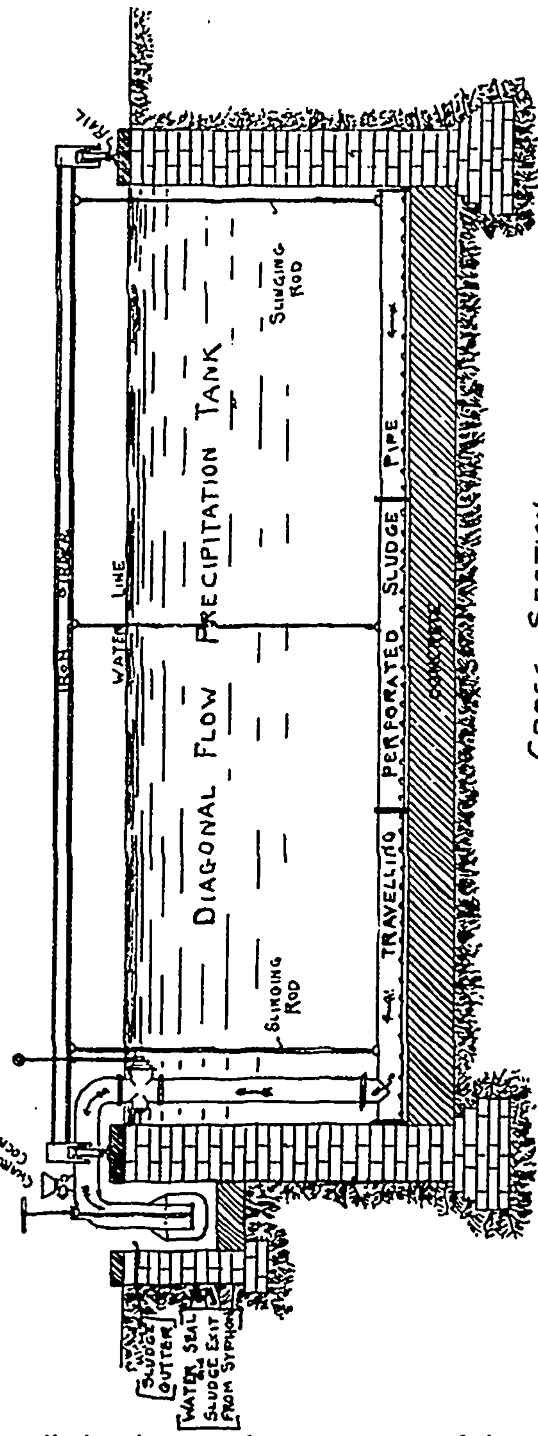
ENGLISH SEWAGE AND WATER WORKS.

BY W. M. WATSON, TORONTO.

The Ferozone and Polarite System.

While in Yorkshire, England, this summer, I inspected several of the recently-built public works.

At the present time the cleaning of sewage is of the first importance, because the Government is in earnest in compelling the local authorities to stop



— Cross Section — of — Candy's Patent — Self Cleansing Rectangular Tank —

polluting the natural water-courses and rivers. During the past twenty years many large and expensive sewage-disposal works have been erected that have proved almost failures, nearly all being too slow in their action and too expensive to work. The authorities are begin-