solved into the state of coal. Contemplate for a moment the length of time required to form a bed of coal such as that which exists in South Staffordshire, having a mean thickness of thirty feet. This is unusual; but even to form a coal bed of but one yard in thickness must have required a long lapse of ages!

It has been somewhat too hastily said that coal is formed directly from wood, and that much of it is found to retain its woody structure. There is, as before stated, great doubt on this point. That wood may be *eventually* converted into coal is admitted—but in changing it entirely loses the form of wood—retains no evidence of fibre. It may, under the influences of heat and moisture, be converted into a bituminous mass, which is eventually consolidated into coal; but we cannot discover any evidence of wood being transmuted directly to coal. The remains of woody trees found fossil in the coal measure strata may be silicified—may become limestone, may be iron ore—certain it is they are never coal. The probability is, that the coal mass itself was produced from cactus-like plants, from club mosses, from peat mosses, or from aquatic plants, either marine or fresh-water.

The vegetable mass, whatever may have been its origin, from which our beds of fossil fuel is derived, may have been formed from plants which grew on the spot where we now find it; and the *under-clay*, as it is called, is supposed to be the soil in which the plants grew; or it may have been removed by the waters in a plastic state, floated out into the deltas or seas, and eventually, in obedience to the law of gravity, have sunk to the beds of the then existing waters.

Knowing that many of these coal beds are several thousand feet below the surface, we have either to suppose—if we adopt the first hypothesis—a gradual subsidence of the earth to the depth at which the coal is now found; or, if we prefer the second, to imagine the filling up of the seas, after the coal has been deposited, by enormous beds of sandstone or of shale. Sir Henry de la Beche describes a section near Swansea having a total thickness of 3,246 feet; in this there are ten principal masses of sandstone, one of these 500 feet thick. They are separated by masses of shale, varying in thickness from ten to fifty feet. The intercalated coal beds sixteen in number, are generally from one to five feet thick—one of them, which has two or three layers of clay interposed, attaining nine feet.—*Memoirs of Geological Survey.*

Taking this instance only, we learn that there have been sixteen different formations of coal; that these have—each one of them—been covered up with hundreds of feet of sandstone and shale. The subsidence of the earth's crust is surrounded with difficulties of no common order—the filling up an ancient sea to the depth of 3,000 feet requires conditions which we can scarcely conceive to have existed — and in either case we seem to require ages of repose, during which a beautiful Flora drank in the sunshine—then cataclysmal action destroying all—followed by ages during which sand was deposited, bearing down with it but little evidence of there being any vegetable life.

Science has advanced far into the secrets of the earth's changes; but let us not deceive ourselves by supposing we have yet heard the voice of Nature proclaiming the true phenomena of our coal formations."—*St. James's (London) Magazine.*

TRANSMISSION OF GOODS ON THE PNEUMATIC PRINCIPLE.

Some experiments on a rather large scale were recently made on the right bank of the Thames, and immediately below the Railway bridge, Battersea, with a view of testing the efficiency of transmitting goods and parcels proposed by the Pneumatic Dispatch Company. The mechanical arrangements in connection with the experimental line of cast-iron tubing—which, like a huge black snake, stretches for more than a quarter of a mile along the river side—are few and simple. Under a temporary shed a high pressure steam engine, of thirty horse power, made by Watt & Co., and having its cylinder placed at an angle of forty-five degrees, is erected, and it gives direct motion through the medium of a crank to a large disc of sheet iron.

The disc runs on tumbler bearings, and narrows from about 2 feet 6 inches in breadth as its centre to 3 inches as its circumference, its diameter being 18 feet. Its interior contains four arms, to which the sheets of iron are fastened, and which serves as fans or exhausters. Through the hollow bearings, upon which the disc is made to rotate at a speed of from 150 to 200 revolutions per minute, a communication exists with a vacuum chamber below, and by the laws of centrifugal action the latter is speedily exhausted, to a certain extent, of air. The speed, in fact, of the disc, determines that extent, and a water Barometer registers it. The air rushes out with considerable force from the periphery of the disc. Between the vacuum chamber and the pneumatic tube, which is 2 feet 9 inches high, by 2 feet 6 inches in breadth, and a transverse section of which resembles that of the Thames Tunnel, there are fitted valves with hand levers for opening and shutting them. These may be said to comprise the whole of the motive and propelling agencies of the pneumatic system.

The tube has been laid down in Battersea Fields, in such a manner as to test severely the practicability of the scheme. It has several very sharp curves and steep gradients throughout its length, and it is socket-jointed, so as to leave its interior, which is just as it came from the sand, free from obstruction. The carriages are five feet in length, of sheet iron, and each turns upon four cast iron wheels of eighteen inches in diameter. The rails—so to speak—are cast in the bottoms of the tubes, and require, therefore, no 'laying' but that which the setting of the tubes themselves give them. A few strips of vulcanized india rubber screwed round the circumference of the face of the carriage constitutes the piston. This, however, by no means closely fills the tube. In fact, there is fully three-eighths of an inch clear between the exterior of the piston and the interior of the tube.

There is no friction, therefore; and, singular to say, the leakage of air does not interfere with the speed of transit. This can only be accounted for by the large end area which the carriages have, in comparison with the small area of leakage space and the comparatively low vacuum required. On Wednesday last the first experiment made was by loading a carriage with one ton of cement in bags, and entering it into the open end of the tube. Upon a given signal the engineer to the company causing the starting valve to be opened, the water barometer showing a column of seven inches in height, and the disc running at the rate of one hundred and fifty revolutions per minute.