have been affected by human agency; 2ndly, That the beach with associated bones could not be a diluvial, or drift, accumulation, because it resembles in character a modern beach, and contains marine shells, and because the bones were found not in, but upon, the deposit; 3rdly, That the beach did not result from glacial action, as there are no indications of it in the neighbouring districts; lastly, he maintains his former views respecting the beach having been raised above the level of the sea, and at a period about, or probably more recent than, the time when the animals, whose remains are found upon it, disappeared. Appended to the paper was a note on a mass of limestone perforated by irregular cavities, considered, by Dr. Buckland, to be due to the action of snails, but which Dr. Moore conceives were formed by pholades.—*Transactions Geological Society.* Athenæum.

An account of the Contortions and Faults produced in the Strata underneath and adjacent to the Great Embankment across the Valley of the Brent, on the Line of the Great Western Railway.
By MR. COLTHURST.

The vegetable soil, on which the embankment was thrown up, rests on a stratum four feet thick, of brown or alluvial clay, under which is a bed of gravel, varying in thickness from ten to three feet, and the whole reposes on London clay of the usual characters. The surface of the valley at this part gradually slopes towards the Brent, the difference of level between the southern or more distant side of the earthwork and the river, being about twenty feet. The height of the embankment is fifty-four feet. On the night of the 21st of May, a settlement was first noticed, and in the morning the foundation was discovered to have given way, and a large mass of ground fifty feet long and fifteen feet wide, to have protruded on the south side, towards the Brent. During the four succeeding months this mass continued to increase, and the disturbance to extend, so that, at the end of that period, the surface, to a considerable distance from the base of the embankment, had assumed an undulated outline, and the subjacent strata, where they were cut into, exhibited corresponding curvatures, cracks, and overlappings in the beds, due to horizontal movements. In the earthwork itself, up to this time, the only evidence of failure, in addition to a sinking in the surface of fifteen feet, was a large crack near the top, and on the side opposite to that in which the foundation had yielded, but slanting towards the same point. Passing over the effects gradually produced during a period of nearly twelve months, at the end of which the total subsidence had exceeded thirty feet, and the swollen ground at the base of the embankment had attained an average height of ten feet, with a range parallel to the earthwork of nearly four hundred feet, and an occasional horizontal displacement of fifteen feet, the author proceeds to describe the nature of the curvatures and other irregularities produced in the strata extending two hundred and twenty feet, or from the foot of the earthwork to the Brent, the bank of which was forced five feet in-

wards; but it is impossible to render the account intelligible without the aid of diagrams. The remedy applied by Mr. Brunel was a supplementary embankment, or terrace, thrown down on the protruded mass; and it has proved effectual. In the second part of the paper, the author dwells upon the magnitude of the disturbing effects thus produced by human agency, and asserts his belief that many of the distortions visible in the solid strata of the earth may have been produced by the effects of superincumbent masses thrown down upon them by the ordinary operations of nature; but while he advocates the explanation of certain geological phenomena by means of pressure from without, he does not deny that many, and more especially the most considerable irregularities which occur in the structure of the earth, may be assigned to other causes.

Ibid.

Franklin Institute.

COMMITTEE ON SCIENCE AND THE ARTS.

*Spaulding & Isherwood's Cast Iron Rails for Railroads.**

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania, for the promotion of the Mechanic Arts, to whom was referred for examination the model and drawings of Cast Iron Rails for Railroads, invented by Messrs. Spaulding & Isherwood, of Owego, New York, REPORT:

That they have attentively examined the model and drawings of this rail, which have been submitted to the Institute, and have discussed the merits of the invention.

They find that this *cast iron rail* consists of two curved ribs in a vertical plane, about eight inches asunder, and upon the upper one reposes a tangent bar, on which the wheels run; these three essential parts are connected and braced by a system of radial posts, combined with diagonal braces; the whole being cast in a conjoined mass, in lengths of ten feet. It is, in fact, a cast iron arch (with a level extrados) nine inches deep at crown, and twenty-one at spring, the skewbacks being joined by a wrought iron tie-bar upon the chord, to secure sufficient abutment.

The quantity of materials required for a mile of single track railway, upon this plan, with a pile foundation, as calculated by the inventors themselves, would be:

140 tons of *cast iron*,
20 tons of *wrought iron*,
1056 *oak piles*, of 11 to 17 inches diameter.

* An isometrical engraving of the *cast iron rail* under consideration, will be found in the American Railroad Journal, for July 15th, 1841, accompanied by a very lucid description, written by the inventors themselves, and this engraving and description have been further circulated through the country in a descriptive memoir, issued in pamphlet form, by Messrs. Spaulding & Isherwood, for the information of the public. Those who feel an interest in this matter can easily refer either to the valuable periodical above mentioned, or to the descriptive pamphlet of the inventors—copies of which they would, doubtless, furnish, for the information of any who might contemplate the use of their rail.