

## POZZOLANA MORTAR AND PINE TIMBER

THE following letter has been sent us for publication by Prof. Tyndall:—

*Villa Guastalla, Via Palestro, Rome, April 14*

SIR,—A very curious and unexpected circumstance has occurred in Rome, which, as it depends on chemical action, may have some interest for you.

Prior to 1870, when Rome became an integral part of the kingdom of Italy, the beams used in the construction of houses were of chestnut wood. After that date a vast amount of building was undertaken and now a whole quarter of the city stands on ground formerly occupied by vineyards and gardens.

In lieu of chestnut, pine was largely used, having been brought *via* Venice from the Dolomite Alps. The latter was preferable, as being procurable of larger scantling, of greater length and at a less cost.

After a few years, the roofs and floors in which the pine had been used were found to be failing. A beam used in a flat roof or in flooring, where it was imbedded in a wall was found to be rotten; while the body of the beam was perfectly sound. A very considerable sum of money was thus lost, as many of the roofs and floors of the new houses on the Esquiline had to be renewed.

But what was the cause of this sudden perishing of the ends of the pine beams, such as had been known to last centuries in Venice? The answer to this question remained a puzzle for a long time; until on taking down the scaffolding of the Ministry of Finance lately completed, a complete answer was found.

One of its scaffold poles had been imbedded for, say, four feet in the ground; about its foot was a heap of the *débris* of Pozzolana mortar, say, six feet high. That part which had been underground was perfectly sound; that which had been surrounded by mortar was utterly rotten; and finally, the remainder of the pole above the ground was perfectly sound. Hence, it was clear that the mortar was to blame. But in what respect did this mortar differ from that used at Venice in which pine wood beams lay embedded for centuries with impunity? The sole difference was in the use of pozzolana—a volcanic earth—instead of sand, and as this substance had been used for mortar in Rome and Naples for ages in contact with chestnut beams with impunity, the only logical conclusion is that pozzolana and pine wood have some chemical affinity which causes some of their ingredients to combine, to the destruction of the latter.

Inclosed are a few grains of pozzolana, such as is used for mortar in Rome.

Yours faithfully,

HENRY H. MAXWELL, Lieut.-General R.A.

Dr. Tyndall

## STANFORD'S STEREOGRAPHICAL MAP OF THE BRITISH ISLES

MR. STANFORD has recently issued a map which marks a distinct advance in British cartography, and one which gives us ground for hoping that some day we may be able to equal in this country the work of the geographical establishments of Germany. The map in question represents, in the first place, the United Kingdom, with its hills and mountains standing solidly out from the ground, as if a perfect relief model of the country lit up from the North had been photographed. The plains and valleys are also clearly shown; on ordinary maps these cannot be distinguished, and yet they are as important features as the hills themselves.

Great care has been taken to embody all the usual information without in any way detracting from the beauty of the map. Thus the railways are shown, and cities and towns, so as not to interfere with the physical

features, as well as the hills and plains, vales and rivers, are named in a clear yet delicate type.

As an example of the information conveyed, we can mark in the map how the ground rises gradually in going west from London all the way to the summit ridge of the Chiltern Hills, and then falls suddenly to the Vale of Aylesbury and the Vale of the White Horse; the ground again rising gradually to the summit of the Cotswold Hills, and then falling suddenly to the valley of the Severn; how the headwaters of the Thames all lie on the top of the second ridge, while the first ridge is the boundary between the Upper and Lower Thames Valley, presenting only one vulnerable point, between Walsingham and Reading, through which the river can make its way.

Mr. Stanford claims that the map is at the same time artistic and scientifically accurate; and from the examination we have made we believe both claims can be well made out.

## OUR ASTRONOMICAL COLUMN

TRANSITS OF MERCURY.—After the transit of Mercury across the sun's disc on Monday next, May 6, which will be visible in this country through about half its duration, there remains only one transit of this planet at the descending node in the present century; it will take place on May 10, 1891, with the following elements according to Leverrier's tables of sun and planet:—

G.M.T. of conjunction in R.A. 1891, May 9, at 15h. 55m. 40s.

R.A. ... ..	46° 44' 14".1
Sun's hourly motion in R.A. ... ..	2 26".2
Planet's " " " " " " " " " "	1 18".7
Sun's declination ... ..	+17° 32' 1".9
Planet's " " " " " " " " " "	+17 18 0".4
Sun's hourly motion in decl. ... ..	+ 0 39".6
Planet's " " " " " " " " " "	1 6".7
Sun's horizontal parallax ... ..	8".76
Planet's " " " " " " " " " "	15".92
Sun's semi-diameter ... ..	15 50".33
Planet's " " " " " " " " " "	6".01

Whence the first external geocentric contact occurs at 11h. 53m. 19s. at 65° from the sun's north point towards the west, for the inverted image, and the last external contact at 16h. 52m. 18s. at 12° from the north point towards the east. At Greenwich the external contact at ingress takes place at 4h. 50m. 26s. A.M. on May 10, and the sun's centre is in the horizon at 4h. 18'.5m., so that Mercury will be only half an hour upon his disc, after observation is possible here. And while the egress of the planet from the solar disc is alone visible in these islands in the transit of 1891, in that of November 10, 1894, at the opposite node—the last phenomenon of the kind in the nineteenth century—the ingress only can be witnessed here, under favourable atmospheric circumstances, not to be insured at this season; the first external contact at Greenwich taking place at 3h. 55m. P.M. and the sun setting at 4h. 18m.

At the sitting of the Paris Academy of Sciences on April 22, a letter from M. André was read, stating that the expedition sent by the Academy and the French Minister of Public Instruction, to Ogden in the Utah territory for the Observation of the Transit of Mercury in the present month, had arrived safely at its destination. After experiencing very liberal treatment from the French Trans-Atlantic Company, the instruments were admitted without payment of duty at New York, and the observers received free passes on the lines of railway converging in Utah, both for the outward and homeward journeys. The Government of Washington placed at their disposal the nearly-finished observatory at Ogden, at the same time undertaking to provide gratuitously all necessary appliances for the observations. A telegraphic wire from Washington to Utah was available