

level of the sea, in a vacuum, be taken and all the part thereof that lies between the axis of suspension and the centre of oscillation be divided into 391393 equal parts, then will 10,000 of these parts be an imperial inch, 12 whereof make a foot and 36 whereof make a yard. It was also enacted that the brass standard yard then in the custody of the Clerk of the House of Commons, should be the Imperial standard yard, and that this Imperial standard yard should be the *unit* or only standard measure of extension wherefrom or wherel; all other measures of extension whatsoever, whether the same be linear, superficial or solid, shall be divided, computed and ascertained, and that the thirty-sixth part of this yard shall be an inch.

It was supposed that by means of the perdulum a new standard yard could be at any time constructed, but when the old standard was rendered useless by the burning down of the Houses of Parliament in 1834 and its restoration rendered necessary, so much doubt was entertained by men of science as to how far the standard could be accurately restored by means of the pendulum, that the present standard was actually constructed from a comparison of copies that had been carefully made of the old standard. This is a solid bar of bronze 38 inches long and one inch square; near each end a small cylindrical hole is sunk in which is inserted a gold plug dressed down even with the bar, and the distance between the centres of these gold plugs, when the bronze is at a temperature of 62° F., is the Imperial standard yard.—18 and 19 V. c. 72.

Some of the difficulties that would require to be met in constructing a standard by means of the pendulum will be rendered apparent by an examination into the conditions which are required by the Act to be observed, and which of course are necessary for a scientific determination of the one

unit from the other. In the first place the experiment must be made in air the buoyancy of which lessens the weight of the pendulum. This buoyancy is known to be different at different times, and careful allowance must be made for it. It is therefore necessary to settle upon that condition of the atmosphere in which the pendulum is to be swung, and accordingly it is enacted that the vibrations shall be such as would be produced by a pendulum if swung in a vacuum.

Again, in consequence of the earth's revolution on its axis every substance on its surface has a tendency to fly off, and this centrifugal tendency contributes somewhat to modify the effect of the attraction of gravitation. It is easy to see that this tendency to fly off is greatest at the equator, and consequently that bodies situated nearer the equator will be less affected by the earth's attraction than those further North or South of it. This centrifugal tendency is sufficient to counteract 1-289 of the force of the earth's attraction at the equator and were the earth to make a revolution on its axis in an hour and a half instead of in 24, substances at the equator would have no weight at all. There is another circumstance which causes a variation in the earth's attractive force for different latitudes, namely, the difference between the equatorial and the polar diameter. In consequence of the earth's surface being farther from the centre at the equator than at the poles the force of attraction will be greatest at the poles and diminish towards the equator. The effect of these two causes combined is that the attractive force of the equator is about 1-194 less than it would otherwise be. The effect of this variation in the earth's attraction is readily perceptible in the vibrations of the pendulum, the increased attraction causing it to vibrate more rapidly, so that a clock regulated to keep correct time at any place will