## CHAPTER II.

THE ATTEMPT TO WEIGH THE EARTH.

It is our task to explain by what means men have succeeded in weighing the earth, and thus become acquainted with the weight of its indegredients. The means is simpler than might be thought at the moment. The execution, however, is more difficult than one would at first suppose. Ever since the discovery of the immortal Newton, it has been known that all celestial bodies attract one another, and that this attraction is the greater, the greater the attracting body is. Not only such celestial bodies as the sun, the earth, the moon, the planets, and the fixed stars, but all bodies have this power of attraction; and it increases in direct proportion to the increase of the mass of the body. In order to make this clear, let us illustrate it by an example. Apound of iron attracts a small body near by; two pounds of iron attracts it preeisely twice as much; in other words, the greater the weight of an object, the greater the power of attraction it exercises on the objects near by. Hence, if we know the attractive power of a body, we also know its weight. Nay, we would be able to do without scales of any kind in the world, if we were only able to measure accurately the attractive power of every object. This, however, is not possible; for the earth is so large a mass, and has consequently so great an attractive power, that it draws down to itself all objects which we may wish other bodies to attract. If, therefore, we wish to place a small ball in the neighborhood of ever so large an iron ball, for the purpose of having the little one attracted by the large one, this little ball will, as soon as we let it go, fall to the earth, because the attractive power of the earth is many, very many times greater than that of the largest iron ball; so much greater it is that the attraction of the iron ball is not even perceptible.

Physical science, however, has taught us to measure the earth's attractive power very accurately, and this by a very simple instrument, viz., a pendulum, such as is used in a clock standing against the wall. If a pendulum in a state of rest—in which it is nearest significance.

to the earth-is disturbed. it hastens back to its resting point with a certain velocity. But because it is started and cannot stop without the application of force, it recedes from the earth on the other side. The earth's attraction in the meanwhile draws it back, making it go the same way over again. Thus it moves to and fro with a velocity which would increase, if the earth's mass were te increase; and decrease, if the earth's mass were to decrease. Since the velocity of a pendulum may be measured very accurately by counting the number of vibrations it makes in a day, we are able also to calculate accurately the attractive power of the earth.

A few moment's consideration will make it clear to everybody, that the precise weight of the earth can be known as soon as an apparatus is contrived, by means of which a pendulum may be attracted by a certain known mass, and thus be made to move to and fro. Let us suppose this mass to be a ball of a hundred pounds, and placed near a pendulum. Then as many times as this ball weighs less than the earth, so many times more slowly will a pendulum be moved by the ball.

It was in this way that the experiment was made and the desired result obtained. But it was not a very easy undertaking, and we wish, therefore, to give our thinking readers in the next chapter a more minute description of this interesting experiment, with which we shall for the present conclude the subject.

## (To be continued.)

RISE AND PROGRESS OF THE STAGE, ORIGIN OF VARIOUS POPULAR ANTHEMS, PLAYS, SONGS, &0., &0.

## au., au.

## PUBLIC THEATRES IN ROME.

THE first public theatre opened in Rome, was in 1671; and in 1677, the Opera was established in Venice. In 1680, at Padua, the opera of Berenice was performed in a style which makes all the processions and stage parapharnalia of modern times shrink into insignificance.

87