On a flat surface, as in Fig. 3, the real horizon is at infinity and the line of sight is parallel with the plane surface. Whole objects can be seen at any distance, their apparent size being governed by perspective. Further, if the earth were flat the sun would rise or set at the same time all over the world. That is not the case.

(4) The increase in size of the circular horizon is another interesting proof of spherical shape for this terrestrial planet. The higher

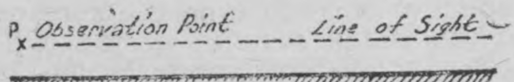

FIG. 3.

the altitude of a point of observation, the greater is the diameter of the circular horizon. This diameter increases at a mathematical rate compatible only with observation above a sphere.

(5) In an eclipse of the moon, the earth's shadow cast on the surface of the moon is always circular in shape. Only a sphere will cast a circular shadow in any direction.

(6) The approximately constant weight of a body, when weighed by spring balance methods on all parts of the earth's surface, is a proof that the body is being weighed on a large sphere.

It is a well-known axiom in physics that every particle of matter in the universe attracts every other particle in the universe with a force which is directly proportional to their respective masses, and inversely proportional to the square of their distances apart.

Expressed mathematically:—

$$F = G\frac{M_1 M_2}{D^2}$$

Where

- F = force of attraction between two bodies M1, M2.
- G = gravitational constant.
- M1 = mass of one body.
- M2 = mass of second body.
- D = distance apart.

The weight of a body on the surface of the earth is really the force with which the earth attracts this body towards its centre. Remembering this, now, consider the weight of an object when weighed at different parts of the earth's surface.

Observation shows the weight for the object to be nearly the same at all places. Then, calling the first weight F1, and the second weight, at a different location, F2, then

$$F_1 = F_2$$

$$\text{Therefore} \quad G\frac{M_1 M_2}{D_1^2} = G\frac{M_1 M_2}{D_2^2}$$

- M1 = mass of object.
- M2 = mass of the earth.
- D1 = distance between centres of M1 and M2 in first case.
- D2 = distances apart in second case.

—and since G, M1 and M2 are constants (no substance being lost from the object or from the earth).

$$D_1^2 = D_2^2 \quad \text{or} \quad D_1 = D_2$$

—And so the distance from the centre of the object to the centre of the earth is the same in both cases. In the same way, it can be shown that distance to the centre of the earth is nearly the same from all parts of its surface. The earth, therefore, must be nearly a sphere.

As a matter of fact, an object weighs just slightly more at the

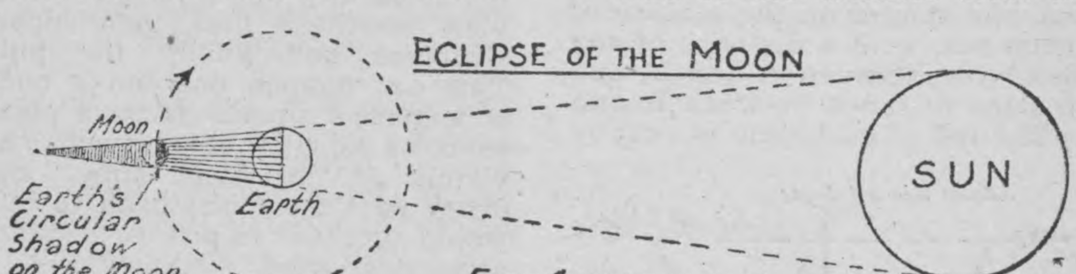

FIG 4. (Not to Scale)