$$D = \nu r \qquad E = \nu' r. \tag{7}$$

Accordingly the velocity of the waves remains approximately constant, (Electrodynamic Wave-Theory of Physical Forces 1.14—157, 1917)

$$V = C \sqrt{(E/D)} = C \sqrt{(\nu' r / \nu r)}. \tag{8}$$

But experience alone can determine whether this condition holds with geometrical rigor, or whether along the actual path, containing diffuse coronal matter, the stationary condition,

$$\delta \int ds = o \tag{9}$$

may not lead to a small deflection of the original path of light.

f) Such an increase of density in the aether, as we recede from the sun was suspected by *Newton* in 1721, (3rd edition of Optics, p. 325). It is of authentic record that *Newton* believed gravitation arises from the impulses of a subtile aethereal medium, but he »was not able, from experiment and observation, to give a satisfactory account of this medium, and the manner of its operation, in producing the chief phenomena of nature«, (*Maclaurin*, Account of *Newton*'s Philosophical Discoveries, London, 1748, p. 111), and thus he left the problem of the cause of gravitation to future investigators.

g) The observed deflection of the rays of stars passing near the sun, amounting to about 1″.75, may be most naturally explained by the action of the gravitational and magnetic wave-fields, under the influence of coronal matter, varying as the inverse fourth power of distance, and the arrangement of the density and rigidity of the aether, near the sun. An arc of 1″ at the sun's mean distance corresponds to an absolute space of 725 kms, 1″.75 to 1269 kms. In the presence of the sun's strong gravitational and magnetic fields, and the magnetized faint coronal matter pervading that wave-agitated region, it is probable that a central refraction or deflection of the light, of this magnitude, somewhat analogous to an unsymmetrical *Zeeman*-effect, may be anticipated. The rotation of the beam of polarized light by magnetism, in *Faraday*'s experiment of 1845, would lead us to expect some action in the sun's coronal wave-field.

h) As *Einstein*'s predicted displacement of the spectral lines towards the red could not be confirmed by *Evershed* and *St John*, who had ample telescopic power to make this shift-effect at least 50 times the probable error of their measures, it cannot be presumed that the deflection of starlight passing near the sun is a confirmation of a purely mathematical theory. The deflection of the light must rather be explained by the physical properties of the aether, interspersed with faint coronal matter, varying as the inverse fourth power of the distance, in the region of intense wave-agitation about the sun.

i) At the joint meeting of the Royal Society and Royal Astronomical Society, Nov. 6, 1919, no one attempted to answer the weighty objections brought forward by Dr. *Silberstein*, who had made a careful study of *Einstein*'s theory, and thus pointed out the bizarre conclusions drawn by some pure mathematicians who are prone to forget that the deflection of starlight near the sun is as purely a physical problem as the refraction of light in the earth's atmosphere. Now the sun's deflection of light is similar to refraction, but

very minute, — half of it being 0″.875, as against 2000″ in our atmosphere, or about 2300 times smaller.

j) Since, according to the report of the observers of the eclipse of May 29, 1919, this minute deflection disappears, when the sun moves out of the path of the light from the stars lying behind it, such a temporary effect cannot properly be attributed to »a warp of space«, but only to the refractive action of the sun's envelope. When *Newton* observed the refraction of light by a prism he had no thought of attributing the effect to »a warp of space«; and one cannot but reflect how fortunate it is that the physical theory of astronomical refraction was perfected by *Newton*, *Laplace* and *Bessel* before such confusing terms as »fourth-dimension-time-space-manifolds« were introduced into science.

k) It cannot be held that *Einstein*'s theory enlightens us on the motion of mercury's perihelion, because at least half a dozen explanations, some of them approved by *Newton*, *Hall*, *Newcomb* and *Seeliger*, are already known; and another simple one, involving no mysticism and no rash assumptions, but following from definitely established physical laws, will be brought out in the present investigation.

2. New Law of the Density and Rigidity of the Aether.

To deduce the law of the wave amplitude (4) in tridimensional space, we proceed as follows. The displacement of any particle of a medium due to wave motion, of a given wave length, is independent of the periodic time, and since the oscillatory orbits of the particles are described in equal times, under continuous flow of the waves, these orbits will be proportional to the displacements or other homologous lines pertaining to the periodic paths of the particles. Let the velocities of the moving particles be v, and m their mass; then their kinetic energies will be represented by $^{1}/_{2} m v^{2}$. In the spherical expansion of the aether waves, there will be no loss of energy in free space; hence on two successive sphere surfaces of thickness dr, the energies are equal, so that we have:

$$4\pi r^{2} \cdot {}^{1}/_{2} m v^{2} = 4\pi r'^{2} \cdot {}^{1}/_{2} m v'^{2}$$

or

$$v^{2} : v'^{2} = r'^{2} : r^{2}. \tag{10}$$

The kinetic energy of the vibrating molecules varies inversely as the square of the distance. But the velocity varies also as the amplitude, in simple harmonic motion: therefore, for the amplitudes A' and A'', corresponding to the radii r' and r'', we have by taking the square root in equation (10)

$$A' : A'' = r'' : r' \tag{11}$$

$$A'' = A' r'/r'' = k''/r'' \tag{12}$$

Accordingly the amplitude or side displacement becomes,

$$A = k/r. \tag{13}$$

And

$$V = M/r =$$
$$= \iiint \{\sigma / \sqrt{[(x-x')^{2} + (y-y')^{2} + (z-z')^{2}]}\} \, dx \, dy \, dz \tag{14}$$

which is the law of the potential first used by *Laplace* in 1782. Thus it appears that if there be aether waves propagated outwardly from any molecule of matter, the amplitude, or maximum displacement of the oscillating particles of the aether, will vary inversely as the radius of the spherical wave-surface.