466.00 **Energy-valve Functioning of Outer Shell of Nuclear Domains**

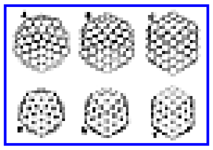

Fig. 466.00

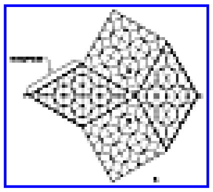

Fig. 466.01

466.01 An earlier version of Fig. 466.01 was first published by the author in 1944: it illustrates the energy-valving aspects of the closest-packed spheres interfunctionings as they occur within the three-frequency, 92-ball outer layer of the vector equilibrium as it "jitterbuggingly" skew-transforms into the icosahedral state, then returns to the vector equilibrium state, passes through, and again transforms to the alternately skewed icosahedral state— repeat and repeat.

466.02 The 90-degree interalignment of the 16 balls of any one of the six square faces of the vector equilibrium (Fig. B) is inherently unstable. The 16 balls resolve their instability by forming any one of two alternate types of most closely packed diamonds (Figs. D and E) with either a short cross axis or a long diagonal axis. Both types are equiedged, equiarea, and most densely packed, and they occupy less area than their equiedged square counterparts. This is quickly evidenced geometrically because both the square (Fig. B) and the diamond (Fig. D) have the same-length base edge XY, but the altitude WZ of the square is greater than the altitude Z of the diamond.

466.03 As displayed in a planar array, Fig. A, there is an apex sphere K surroundingly shared by the innermost corners (vertexes) of two square-faced, 16-ball grids, M and N, as well as by the two diamondsÑthe short-axis diamond E and the long- axis diamond D.

466.04 The apex sphere K's neighboring spheres are uncomfortable because K is surrounded by seven spheres and not six. Only six can closest pack around one in any given plane. One of the two adjacent spheres M or N from the two square-faced grids will get pushed in, and the other one will be pushed out, depending upon which way the vector-equilibrium-to-icosahedron jitterbug transformation is rotating around apex sphere K. The "in-and-out" pumping of spheres M and N acts as an energy-propagating valve.

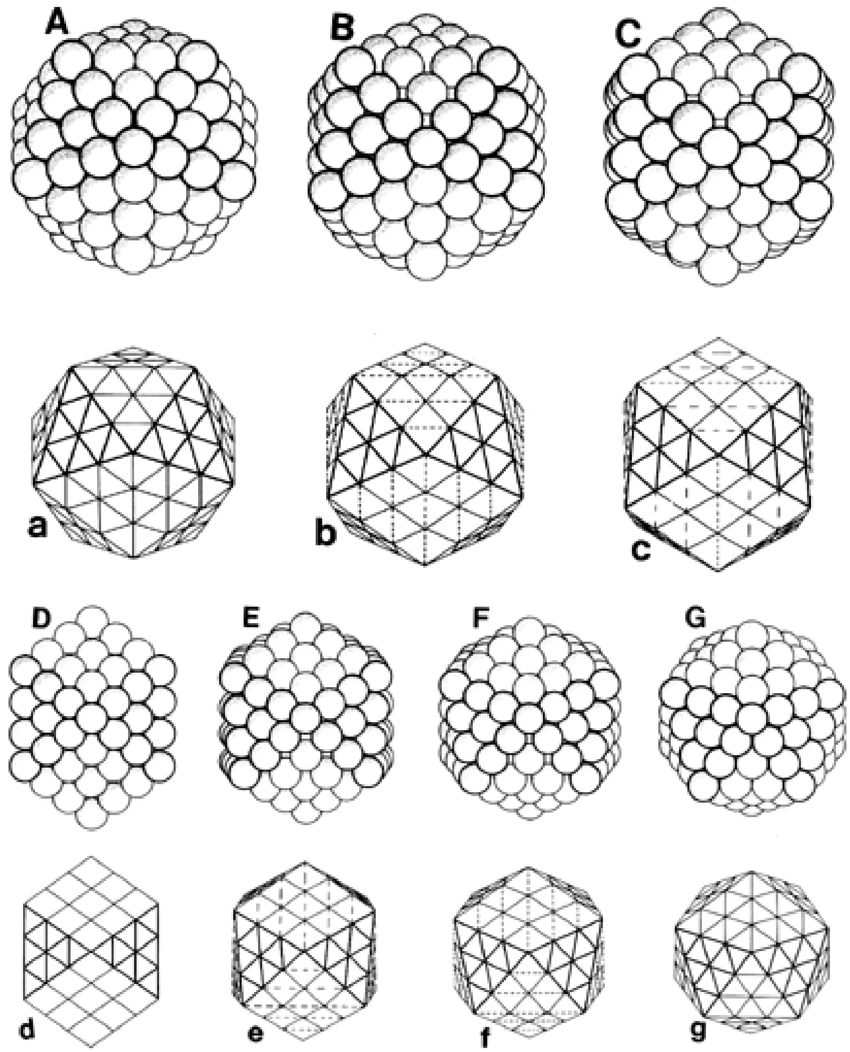

Fig 466.00 Energy-valve Functions of Closest Sphere Packing: This series illustrates the skew- transformation of the 92-ball icosahedral aggregate to a vector equilibrium conformation and its return to the icosahedral state.

Figs. 466A-G illustrate closest-sphere-packing transformation.
Figs 466a-g illustrate polyhedral resultants.

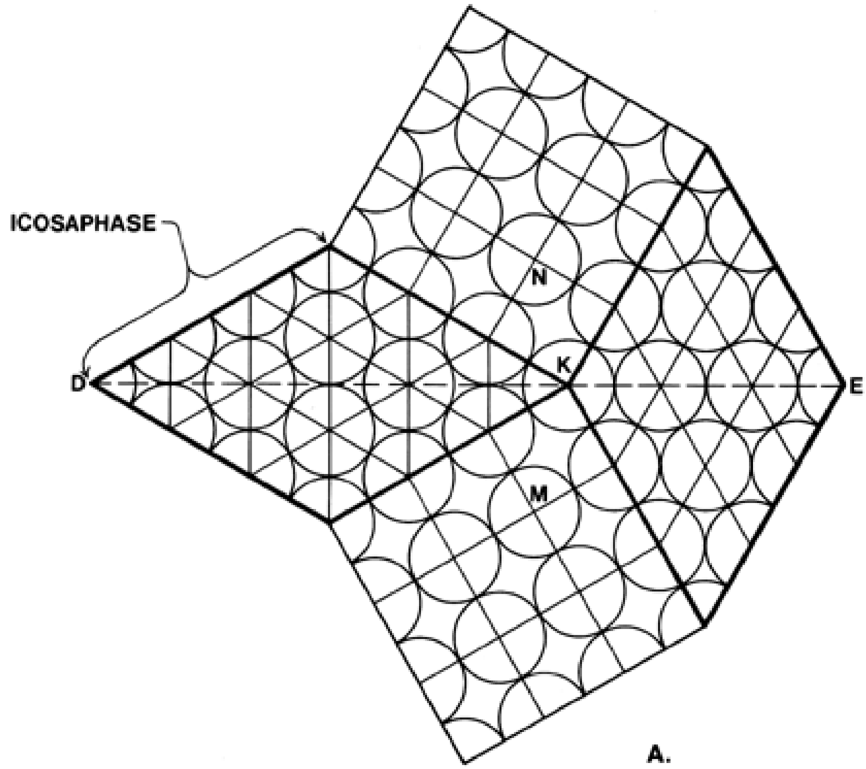

Fig. 466.01 Reciprocal Motion of Nine Internal Spheres Propagates Wave by Diagonal Elongation: (The original version of this drawing was copyrighted by R. Buckminster Fuller in 1944.) This is a planar representation of the closest-packed spheres in the outer layer as they skew-transform between the icosahedral and the vector equilibrium phases.

A. Apex sphere K surrounded by two 16-ball grids M and N, and by short-axis diamond E and long-axis diamond D.
B. The 90-degree alignment of the 16 balls of any one of the six square faces of the vector equilibrium.
C. Plan view of the closest-packing aspects of any one of the vector equilibrium's four pairs of nuclear tetrahedra as they begin to torque in the jitterbug process.
D. Short-axis diamond.
E. Long-axis diamond.

466.05 Fig. C is a plan view of the closest-sphere-packing manifestation of any one of the vector equilibrium's four pairs of nuclear tetrahedra as they commence to torque in the jitterbug process. An isometric sketch of this net 39-ball aggregation is given at Fig. 466.31 Note that this torqued pair of nuclear tetrahedra employs three of the vector equilibrium's six axes. The two unengaged axes of the equator are starved and inoperative.

466.10 **High-frequency Sphericity Approaches Flatness**

466.11 Where we have six balls in a planar array closest packed around one nucleus, we produce six top and six bottom concave tetrahedral valleys surrounding the nucleus ball. We will call the top set of valleys the northern set and the bottom set the southern set. Despite there being six northern valleys we find that we can nest only three close- packed (triangulated) balls in the valleys. This is because we find that the balls nesting on top of the valleys occupy twice as much planar area as that afforded by the six tetrahedral valleys. Three balls can rest together on the top in omni-close-packed tangency with one another and with the seven balls below them; and three balls can similarly rest omniintertangentially in the bottom valleys as their top and bottom points of tangency bridge exactly across the unoccupied valleys, allowing room for no other spheres. This produces the symmetrical nuclear vector equilibrium of 12 closest-packed spheres around one. (See Fig. 466.13A.)

466.12 The three balls on the top can be lifted as a triangular group and rotated 60 degrees in a plane parallel to the seven balls of the hexagonal equatorial set below them; this triangular group can be then set into the three previously vacant and bridged-over valleys. As this occurs, we have the same 12 spheres closest packed around one with an overall arrangement with the two triangular sets of three on the top, three on the bottom, and six around the equator. The top and the bottom triangular sets act as poles of the system, which— as with all systems— has inherent free spinnability. In both of the two alternate valley occupations the northern polar triangle is surrounded alternately by three squares and three triangles, reading alternately— triangle, square, triangle, square, triangle, square. (See Fig. 466.13B.)

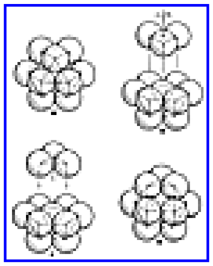
Fig. 466.13

466.13 In one polar triangular valley occupation the squares of the northern hemisphere will be adjacent to the triangles of the southern hemisphere. This is the vector- equilibrium condition. In the alternate valley nesting position at the equator the equatorial edges of the squares of the northern hemisphere will abut the squares of the southern hemisphere, and the triangles of the northern hemisphere will abut those of the southern, producing a polarized symmetry condition. In the vector-equilibrium condition we have always and everywhere the triangle-and-square abutments, which produces a four- dimensional symmetry system. (See Sec. 442 and Fig. 466.13C.)

466.14 There is then a duality of conditions of the same 12 nucleus-surrounding first omni-inter-closest-packed layer: we have both a polarized symmetry phase and an equilibrious symmetry phase. Under these alternate conditions we have one of those opportunities of physical Universe to develop a pulsative alternation of interpatterning realizations, whereby the alternations in its equilibrium phase do not activate energy, while its polarized phase does activate energetic proclivities. The equilibrious phase has no associative proclivities, while the polarized phase has associative proclivities. In the polarized phase we have repulsion at one end and attraction at the other: potential switchings on and off of energetic physical Universe. (See Figure 466.13D.)

466.15 When modular frequency enters into the alternately vector equilibrium«polarized conformations, the vertexes of the multifrequenced nuclear system are occupied by uniradius spheres, whereat it is evidenced that the equatorial continuity set of spheres can be claimed either by the northern or southern set of triangles and squares, but they cannot serve both simultaneously. Here again we have alternating conditions— starving or fulfilling— of northern and southern hemispheres matching or nonmatching triangles and squares, with the central equilibrium condition having a large plurality of alternately realizable behaviors under variously modified conditions affected further as frequency increases the numbers of edge-vertex-occupying spheres.

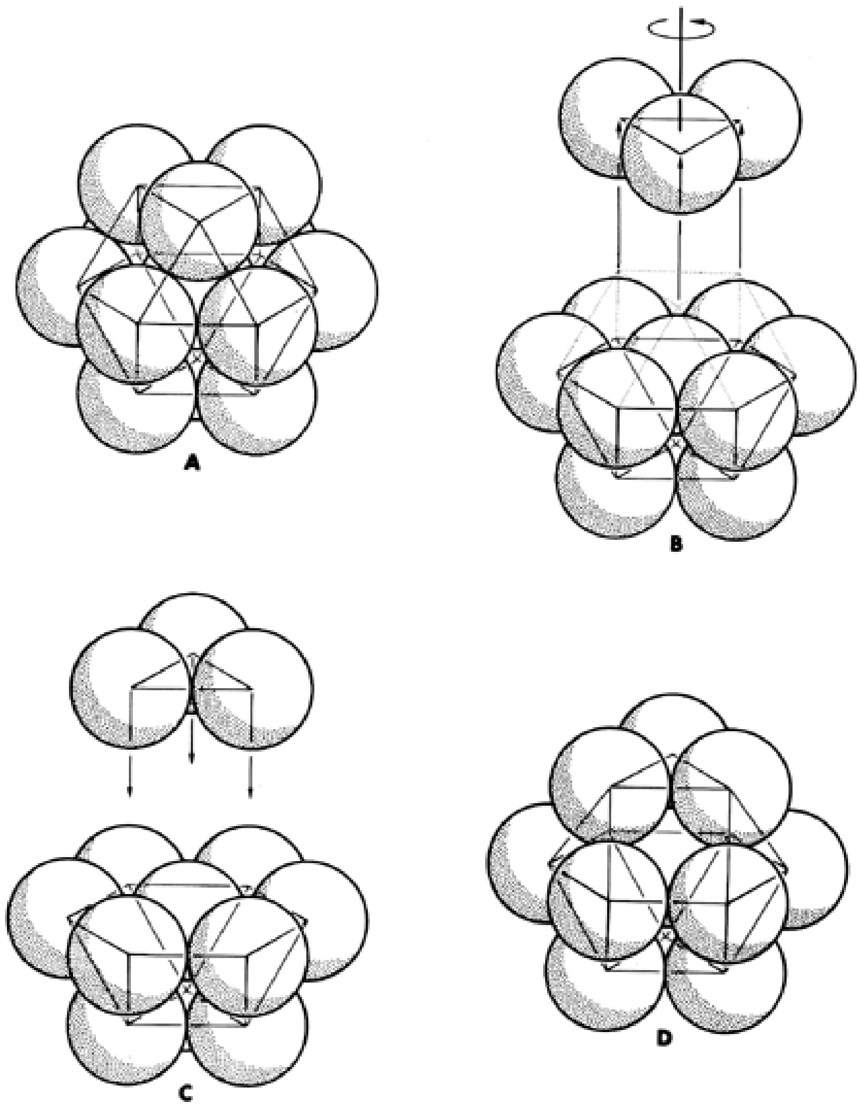

Fig. 466.13

A. Twelve Closest-packed Spheres around One: Symmetrical nuclear vector equilibrium.
B. Twelve Closest-packed Spheres around One: Rotation of top triangular group.
C. Twelve Closest-packed Spheres around One: Alternate nestability in polar triangular valley.
D. Twelve Closest-packed Spheres around One: Alternate polarized symmetry of vector equilibrium.

466.16 As the frequencies of vector equilibria or icosahedra increase, the relative size of the occupied arcs of the great circles involved become of ever lesser magnitude. At a high frequency of larger spheres— for example, planet Earth— the conditions of patterning around the 12 external vertexes of the vector equilibria or icosahedra appear to be approximately flat, in contrast to the sharp concavity/convexity of the nonfrequenced convergence of the four planes around the corners of the vector equilibrium and the convergence of the five planes around the corners of the icosahedron.

466.17 In very-high-frequency nuclear systems the approach to flatness from the four planes to five planes tends to induce a 360-degreeness of the sums of the angles around the critical 12 vertexes— in contrast to the 300degree condition existing in both the unfrequenced vector equilibrium and icosahedron. That is what Fig. 466.01 is all about.

466.18 In Figs. 466.01 and 466.41 there is introduced an additional 60 degree equilateral triangle, in surroundment of every directly-nuclear-emanating vertex K. The 12 vector-equilibrium K vertexes are always in direct linear relationship with the system nucleus (see Sec. 414). The additional degrees of angle produced by the high-frequency local flattening around K vertexes introduces a disturbance-full exterior shell condition that occasions energetic consequences of a centrifugal character.

466.20 **Centrifugal Forces**

466.21 As we get into ultra-ultra-high-frequency, and as we get to greater and greater sphericity, by virtue of the inherent spin, we can account for the vector equilibrium becoming the sphere of lesser radius, becoming the sphere of approximately tetravolume 5, while the relative flatness around the critical K vertexes relates to the centrifugal forces involved.

466.22 People think of centrifugal force as picturable by arrows expelled radially (perpendicularly) outward. But in fact centrifugal force operates as a hammer-thrower's hammer does: it departs from the system tangentially, not radially. Since the outward tangent ends reach ever farther away, there is a net only-indirectly-radial force realized. This common misapprehension of the assumed 180-degreeness of centrifugal forces has greatly misled human thinking and has obscured comprehensions of precession.

466.23 At certain high frequencies the energy displacements tend to occur that do not tend to occur at low- or no-frequency conditions, which brings us into the realm of possibly comprehending the photon-emitting radiation limits of operation within the 92 regenerative chemical elements and the split-second articulatability of transuranium nuclear systems when bombarded with ultraultra-high-frequency energy missiles. The lower the frequency, the higher the required bombardment energies.

466.30 **Nuclear Tetrahedra Pairs: Closest-sphere-packing Functions**

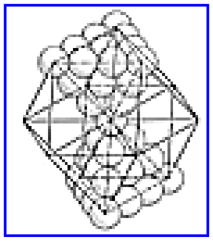

Fig. 466.31

466.31 In Fig. 466.01-C is a plan view of the closest-sphere-packing manifestation of any one of the vector equilibrium's four pairs of nuclear tetrahedra as they commence to torque in the jitterbug process. An isometric sketch of this net 39-ball aggregation is given in Fig. 466.31. Note that this torqued, north-south-pole, axial pair of tetrahedra employs three of the vector equilibrium's six axes. The other three unengaged axes lying in the equator are starved and inoperative— angularly acceleratable independently of the north-south axial motion.

466.32 In Fig. 466.01-C we see the internal picture from the nucleus to the vertexes displaying the hexagonal pattern emerging at F^3.

466.33 There can be only one pair of tetrahedra operative at any one time. The other three pairs of tetrahedra function as standby auxiliaries, as in the triangular-cammed, in- out-and-around, rubber cam model described in Secs. 465.01 and 465.10.

466.34 The active triangular face has to share its vertexes with those of the adjacent square-face grids. This transformation relates to the transformation of the octahedron and the rhombic dodecahedron.

466.35 In the outer layer of 92 balls— two of which are extracted for the axis of spin—there are eight triangular faces. There are four balls in the center of each of the six square faces.

6 × 4 = 24. 92 - 24 = 68. 68/8 = 8 l/2.

We need 20 balls for a pair of complete polar triangles.

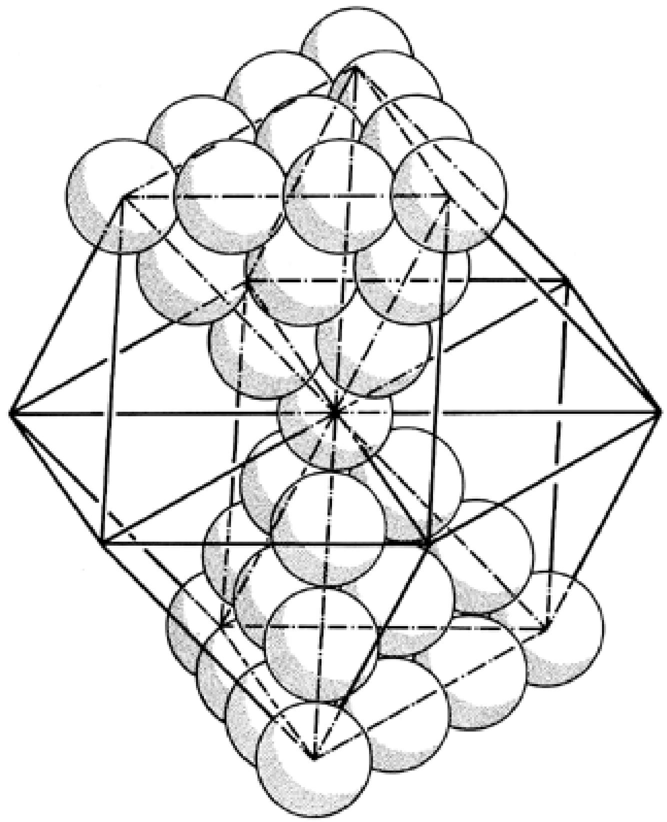

Fig. 466.31 Nuclear Tetrahedra Pairs: An isometric view of 39-ball aggregate of torqued, north-south pole, axial pair of tetrahedra at nucleus of vector equilibrium.

68 - 20 = 48. 48/8 = 6; a pair of 6s = 12.

Thus there are only 12 available where 20 are required for a polar pair. In any one hemisphere the vertex balls A, B, C used by a polar triangle make it impossible to form any additional polar units.

466.40 **Universal Section of Compound Molecular Matrix**

466.41 The illustration at the back-end paper was first published by the author in 1944. It displays the surface shell matrix of an ultra-high-frequency sphere in which a local planar flatness is approached. The vertexes are energy centers, just as in the isotropic vector matrix where 12 exterior corner vertexes of the vector equilibria are always connected in 180-degree tangential direct radial alignment with the nuclear sphere.

466.42 This compound molecular matrix grid provides a model for molecular compounding because it accommodates more than one tetrahedron.

466.43 This matrix is not isotropic. It is anisotropic. It accommodates the domain of a nucleus.

Next Section: 470.00
