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Thomas T. Brown: Gravitic Isotopes & Tribo-Excitation

Thomas Townsend Brown discovered two methods of producing gravitationally-anomalous isotopes and materials, by centrifuging/settling in fluids of progressive specific-gravity, and by tribo-excitation:

Canadian Patent # 726958

(February 1, 1966)

Method for Beneficiation of & Devices Employing Gravitational Isotopes

Thomas Townsend Brown

This invention relates to so-called gravitational isotopes and their beneficiation and to control devices utilizing the beneficiated isotopes.

The invention and the practical results thereof subscribe to the postulate of the non-equivalence of gravitational mass and inertial mass.

A gravitational isotope is that fraction or constituent of a sample of an element having the same inertial mass but a different gravitational mass than the balance of the sample. Such isotopes may be either lighter or heavier (gravitationally) than the normal composition but will have approximately the same inertial mass as the normal composition. The term "gravitational isotope" as used herein is not to be confused with the term "inertial isotopes" commonly referred to in physics merely as "isotopes". Every known method of separating particles of the same element, which differ only in inertial mass from other particles of the element, utilizes a difference in inertial response to separate these particles. One example of these known types of methods is the use of the mass spectrograph in which uniformly charged particles are projected into an electrical field and separate due to difference in inertial mass.

These heavier or lighter atomic isotopes are heavier or lighter only in the gravitational sense, in that they react differently to the force of gravitation. Hence, their gravitational mass, as distinguished from their inertial mass, is different. In other words, and as usually expressed, the weight-to-mass ration is different; but it is to be understood that the mass so referred to is inertial mass. In making this distinction, it is also important to understand that it must be the inertial mass which is equated to energy, as E = mc2.

In the various gravitational isotopes referred to, the weight-to-mass ratio is different from one isotope to another, as well as from the raw material from which the isotopes are extracted. It is believed that this ratio varies from one pure gravitational isotope to another in steps which are exact multiples of uniform whole numbers; hence, the use of the word "isotope", meaning "same place". In general, the total inertial mass of the gravitational isotopes is approximately the same as the inertial mass of the sample as a whole, though there may be some differences. In some cases there appears to be an inverse relationship, with a very slight increase in inertial mass accompanying a large decrease in gravitational mass.

The weight-to-mass ratio of a wide variety of natural terrestrial materials, according to the investigations of Oetvos and others, appears to be unity for low values of gravity and centrifugal force, such values being those due to the surface gravity and rotation of the earth on its axis. These results, having been derived from experiments of great accuracy, were subsequently accepted as grounds for the Postulate of Equivalence, upon which the General Theory of Relativity was based. It is to be pointed out, in connection with a better understanding of the present invention, that the equivalence of mass and weight must be presumed to be valid only for comparatively weak fields, and that the law governing the relationship must be non-linear. Such non-linearity would result in observable non-equivalence as the divergence is increased due to the use of high or ultra-high centrifugal forces.

Briefly, in accordance with aspects of this invention, raw materials such as silica (cristobalite, tridymite, quartz, silver sand or vitreous silica) containing gravitational isotopes of silicon are finely subdivided, such as by grinding, to the desired size; for example, of the order of 40 microns. The silica or other material is then introduced into a fluid having a density such that a portion of the material just floats and the remainder settles to the bottom; for example, a density of 2.65.

Examples of such fluids are thallium formate or thallium malonate which may be diluted to the desired density by mixing with a fluid of lower density, such as water. Thallium formate alone has a density of approximately 4.0 as compared with water and by mixing with distilled water, any desired density between 1.0 and 4.0 may be obtained. Another example of such a fluid is acetylene tetrabromide, which has a density of approximately 3.0 as compared with water. Acetylene tetrabromide may be diluted with ether or alcohol until the desired density is obtained.

The next step is to separate the portion of the material which floats in the fluid having a density of 2.65 from that which sinks in the fluid. This can be done by any convenient means, such as decantation.

If it is desired to isolate the lighter gravitational isotopes of silicon from the heavier, then the silica from the decanted portion is introduced into a centrifuge containing a fluid of the same density (2.65 in the example given) as that employed in the immediately previous settling step. At this point, the pulverized silica "just floats". The centrifuge is now operated with a sufficient speed of rotation to cause a portion of the floating material to sink toward the outer end of the centrifuge tube in spite of the enormously increased buoyancy of the field due to hydrostatic pressure. It is that portion of the material containing the lighter gravitational isotopes which is thrown outward in the centrifuge. The reason for this is explained later. The tube is then frozen, the centrifuge stopped and the material from the outer end of the tube is cut away and removed. It must be understood that if the fluid in the tube is not frozen while the centrifuge is still running, so as to hold the material in place, the material which has sunk to the end of the tube will again rise to the surface as the inertial forces are weakened and the gravitational forces again predominate. Any means for removing the materials continuously, while the centrifuge is operating, will serve the same purpose.

The sedimentation step is now repeated with the material from the outer end of the centrifuge tube in a fluid which has a slightly lower density than the fluid employed in the first and second steps. For example, if the fluid employed in the first and second steps has a density of 2.65, then the fluid employed in the third step may have a density in the order of 2.5

That portion of the material which floats plus that in the upper layer of the precipitate is retained and introduced into a centrifuge tube containing a fluid. In this instance, the fluid in the centrifuge tube is adjusted to a greater density than the fluid employed in the previous centrifuge step, say 3.0, which now causes allthe material to float.

The centrifuge is again operated and after a period of time the fluid is frozen. The centrifuge is then stopped and the material is cut away and removed from the bottom of the centrifuge tube. Alternate settling and centrifuging steps are repeated until the required amount of gravitational isotopes is separated. Each successive step yields a smaller and smaller fraction of respectively lighter and lighter isotopes.

The end-produce of the last step will be a material which is gravitationally very much lighter than an equal number of particles of the average initial material (or the material which settled at the bottom in the first sedimentation step). If gravitational isotopes heavier than the normal composition are desired, the opposite fractions are retained in each step of the process. The stages of beneficiation may be repeated until a suitable amount of gravitational isotopes of each fraction is obtained. Each fraction so isolated is characterized by a specific weight-to-mass ratio which progressively increases or decreases with each stage.

It is to be noted that, in the first sedimentation step and in the first centrifuging step, the fluid employed had the same specific gravity. In each subsequent sedimentation step where it is desired to separate progressively lighter gravitational isotopes, fluid of a progressively lower specific gravity is employed, while in each subsequent centrifuging step, fluid of a progressively higher specific gravity is employed. For example, if the first stage fluid had a specific gravity of 2.65, the second stage sedimentation step might employ a fluid of specific gravity 2.5 and the second stage centrifuging step might employ a fluid of specific gravity 3.0. The third sedimentation step might employ a fluid of sp. Gr. 2.1, while the third centrifuging step might employ a fluid of sp. Gr. 3.5.

Where it is desired to separate progressively heavier gravitational isotopes from the raw material, fluids of progressively higher specific gravity are employed in each subsequent sedimentation step and fluids of progressively lower specific gravity are employed in each subsequent centrifuging step.

Briefly, in accordance with this novel method for separating gravitational isotopes, two buoyancy or hydrostatic balancing steps are utilized -- one employing gravitational forces (settling) and the other employing inertial forces (centrifuging). In each step, the forces acting directly upon the material are balanced, or at least largely offset, by the buoyancy due to hydrostatic forces causes by forces acting on the fluid. This is the well known principle of the hydrometer. Where the fluid responds equally to gravitational and inertial forces, as when its weight-to-mass ratio is unity, material balanced in the first step will remain equivalently balanced in the second step (at high centrifugal speeds) only if it also has a weight-to-mass ratio of unity. Any departure from unity will create an unbalance during the second step which will cause that fraction containing the anomalous material to float or sink (as the case may be) in the centrifuge tube. This process may be termed "differential centrifugal hydrometry".

Hence, it will be readily seen that those materials possessing a weight-to-mass ration near unity, which presumably constitute the bulk of natural terrestrial materials, will not forcibly separate in the centrifuge step. If such material "just floats" in the gravitational situation, it will continue to "just float" in the inertial situation even at ultra-high centrifugal speeds. If it has sunk gravitationally, it will continue to stay at the bottom during centrifuging. Only those materials or fractions of materials having weight-to-mass ratios other than unity, that is, containing gravitational isotopes, will be hydrostatically unbalanced and will move to the opposite end of the tube during centrifuging.

One important feature in the present invention is the centrifugal hydrometric balance as described above. It is somewhat dependent upon the use of a fluid possessing a weight-to-mass ratio of unity, although the effects of a departure from unity, if known precisely, can be compensated. The purpose of alternate settling steps is largely to provide rough selection and to rid the system of "tailings" as rapidly as possible.

In the case of materials containing lighter gravitational isotopes there is, in most instances, a spontaneous evolution of energy in the form of light, heat, etc., not due to radioactivity or chemical or bacterial action. Usually, none of such materials is radioactive in the accepted sense or subject to spontaneous chemical or bacterial decomposition. Nevertheless, such materials are nearly always warmer than their environment.

Conversely, in the case of materials containing heavier gravitational isotopes than the environment, there is continuous absorption of heat and usually a temperature lower than the ambient.

The cause of these thermal effects is not known. One hypothesis holds that a high ration of inertial mass to gravitational mass is coexistent with a high energy level (excited state) in the material, and this results in a spontaneous release of energy to the environment. The activity of such materials decays with time, presumably as the energy level approaches that of the surroundings. This loss of energy results in a gradual lowering of the mass-to-weight ration of the material (eventually) to unity.

A more recent extension of this hypothesis, possibly useful in understanding the present invention, suggests that matter may contain certain minute but significant quantities of anti-matter in metastable equilibrium. Anti-matter is conceived as having positive inertial mass but negative weight; hence, its presence in (ordinary) matter would alter the mass-to-weight ration. Immediate annihilation of one form of matter by the other would be prevented in the natural state by the isolation or compartmentation of the anti-matter in "cells" bound by electric (Helmholtz) double layers and gravitational repulsion barriers. The comparatively infrequent and random annihilations, possibly due to the loss of equilibrium or rupture of "cells" may therefore account for the radiated energy and the phenomenon of slow decay.

Most of the raw materials investigated (containing lighter gravitational isotopes) are characterized by being measurably warmer (0.002-0.005° C) than their surroundings. These raw materials are further characterized by a small but definite retardation in gravitational acceleration, i.e., a lower value of g in free fall. Some of the known raw materials are aluminum silicate, cobalt-nickel silicate, barium aluminate, beryl crystal (comprising pure beryllium aluminum silicate), and beryl ore (containing crude barium aluminum silicate). The invention is not, however, limited to these compositions or the isotopes of aluminum or silicon but includes other elements or materials in general which contain gravitational isotopes.

The fractions of lighter or heavier gravitational isotopes in natural materials are very small and beneficiation in the form of concentration or refinement is necessary for commercial utility.

The different isotopes separated by the above method may be utilized to provide a gravity-sensitive element or an acceleration-sensitive element comprising two masses tending to counter-balance each other. In each case, at least one of the masses includes a gravitational isotope or a substance having the same inertial mass as the normal substance but having a different weight. In the gravity-sensitive device (which is insensitive to acceleration), the two opposing masses have the same inertial mass but different gravitational masses. In the acceleration or inertial-sensitive device (which is insensitive to gravity), the two masses have the same gravitational mass but different inertial masses.

For convenience, both positive and negative acceleration forces and centrifugal force will be characterized as acceleration or inertial forces.

The illustrative control devices are particularly useful when it is necessary to make the device insensitive either to gravity or inertial forces while being sensitive to the other. In aerial navigation, such as the control of guided missiles or the like, which may travel very far from the earth, certain controls depend upon the establishment of a "stable vertical" with reference to the earth and the vector of gravity, and which are independent of or insensitive to disturbances introduced by inertia. Other controls must be responsive to inertial forces without being influenced by the earth's gravitational field. One means for attaining the foregoing objects is to employ systems which are balanced wither with respect to gravitational forces or to inertial forces (so as to be insensitive thereto) without being balanced with respect to the other force. One type of such control device is illustrated in the drawing.

Another novel form of force-sensing device utilizes a mass differential (either gravitational or inertial) between a solid member and the fluid in which the member is immersed. When the member and the fluid have the same inertial mass but different gravitational mass, the device is sensitive to gravity while being insensitive to inertial forces. Conversely, when the member and the fluid in which it is immersed have the same gravitational mass but different inertial mass, the device is sensitive to inertial forces while being insensitive to gravity. To achieve these differences in mass, gravitational isotopes may be included in the solid member or in the fluid depending on the unbalance desired and the particular gravitational isotope employed.

The device in this form has the advantage of being quite simple mechanically, self-compensating and free from fulcrum or pivot adjustment. The strength of the mechanical suspension of the immersed movable member or members need only be sufficient to handle the differential forces which the device is designed to sense. The presence of the fluid also provides desirable damping.

In the illustrative method of concentration or refinement, the first step is to obtain a selective gravitational separation or settling of the raw material containing gravitational isotopes. Generally, such materials will contain, in addition to the normal composition and its gravitational isotopes, foreign materials or impurities differing widely from the aforesaid composition in specific gravity. Preferably, the material is pulverized so that in some particles there will be a greater than average concentration of such isotopes. Generally, methods employed in ore dressing for selectively gravitationally separating powdered materials of different weight, may be employed; although, because of the generally small difference in specific gravity between normal compositions, even with various amounts of isotopes as they occur in nature, the most sensitive separating methods should preferably be employed at least in the initial separating steps.

One illustrative method includes the step of floating and/or settling the material from a fluid, such as thallium formate or acetylene tetrabromide, as mentioned above. However, if the material be ground very fine or be of low gravity, a less dense fluid, such as a gas, may be used in order to induce a more rapid settling. Very fine grinding (e.g., minus 325 mesh, i.e., 43 microns) has the advantage of producing a greater difference in gravity between the particles of the same size, but the disadvantage of slower settling and the greater influence on results if the particles differ substantially in size.

Upon completion of the gravitational separating process, there will be a greater concentration of heavy material in the lower portion of the layer of settled material than in the upper portion. At least in the initial separating steps there will be no sharp division between heavier and lighter materials, but merely a gravitational (density) gradient from the lower to the upper portions of the layer of settled materials. In the case of compositions containing lighter gravitational isotopes, the flotage and/or the upper portion of the layer is retained. How much of the layer is retained may depend on the degree of difference in weighs of material from top to bottom of the layer; but, if one retains simply half the layer each time, it is evident that in five settling steps (with intervening centrifuging explained below in greater detail) the final fraction will comprise 1/1024 (roughly 0.001) of the original material and will, theoretically, contain about 1000 times the concentration of gravitational isotopes occurring in the original material.

The flotage and retained upper layer of material will comprise a mixture of lighter gravitational isotopes and normal matter having about the same specific gravity as the isotopes. A rough separation between the isotopes and the normal matter is then effected by inertial forces, as by centrifuging while hydrostatically balanced. Normal matter, having a mass-to-weight ratio equal to the supporting fluid, presumably unity, is not influenced and remains floating or largely in suspension. The lighter gravitational isotopes, on the other hand, having a mass-to-weight ratio greater than the supporting fluid are not proportionally balanced even by the tremendous increase in buoyancy accompanying the high centrifugal forces and thus are made to sink. During centrifuging, a greater number of lighter isotopes will thus be found in the outer layer (bottom) of the centrifuge. The normal matter, including the heavier gravitational isotopes, will continue to float or be more concentrated in the inner layer. In batch beneficiation, the centrifuge tubes or containers of fluid may be frozen while the centrifuge is in operation. This prevents remixing of the materials when the inertial forces causing the separation are withdrawn. In certain cases, impaction of the material containing the greater concentration of isotopes may be sufficient to prevent remixing when the centrifuge is stopped. In such cases, freezing may not be necessary.

In continuous beneficiation, the material is removed continuously from the inner and outer layers of the centrifuge while it is operating. Where lighter isotopes are being separated, material in the inner layer may be discarded, and that in the outer layer retained. The latter will comprise some of the normal material mixed with a greater concentration of lighter gravitational isotopes (about twice where half the settled layer is retained each times) than in the original material.

The aforesaid sequence of settling and centrifuging steps is then repeated as often as is necessary to secure the desired beneficiation or concentration. As the isotopes become more concentrated, different settling methods may be employed if there be a substantial difference in weight between the isotopes and the remaining material (referred to as gangue in ore dressing).

Accordingly, it is a feature of this invention to separate the gravitational isotopes of an element by the steps of floating and/or settling the isotope containing material in a fluid and differentially hydrometrically centrifuging the material obtained from one layer of the material in the flotation or sedimentation stage.

It is another feature of this invention to alternately employ the steps of floating and/or settling an isotope containing material in a fluid and differentially hydrometrically centrifuging selected materials from the flotation or settling stage to separate different isotopes of the selected materials.

It is an equivalent feature of this invention to separate materials of anomalous mass-to-weight ratio from normal materials by utilizing differential centrifugal hydrometry as described.

It is another feature of this invention to utilize members having different gravitational masses and equal inertial masses to provide a stable vertical device.

It is another feature of the invention to utilize members having different gravitational masses and equal inertial masses to provide a gravity measuring device which would be free from the disturbing influences of acceleration, such as an airborne gravity meter.

It is another feature of this invention to employ a plurality of members having equal gravitational masses and unequal inertial masses to provide an accelerometer which is independent of gravitational forces.

Various other objects and features of this invention may be readily understood from the following detailed description when read with the accompanying drawings in which:

Figure 1A and **Figure 1B** are diagrammatic representations of one illustrative method of beneficiation;

FIG. 1A

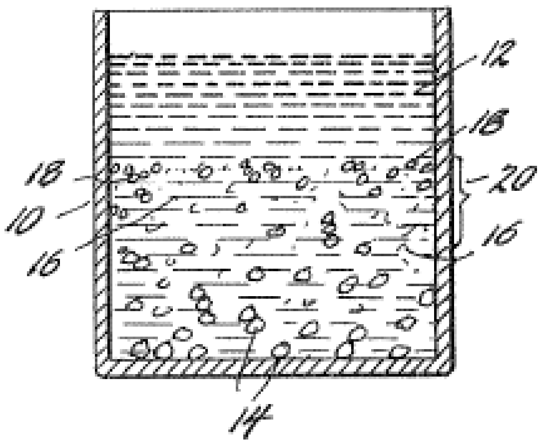


FIG. 1B

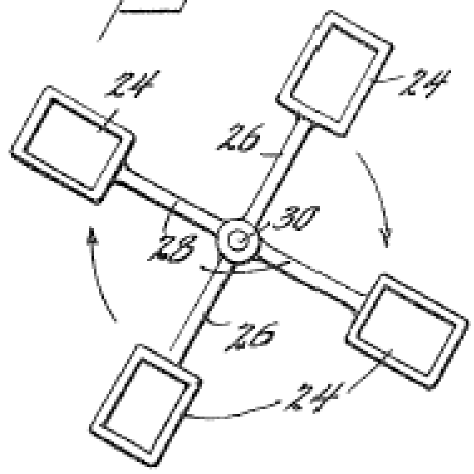


Figure 2 is a diagram on an enlarged scale illustrating the arrangement of materials on completion of the gravitational separating step of Figure 1;

FIG. 2

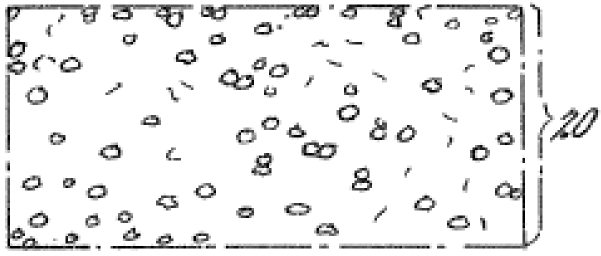


Figure 3 is a diagram on an enlarged scale illustrating the arrangement of materials

on completion of the centrifuging step;

FIG. 3

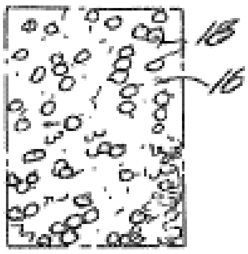
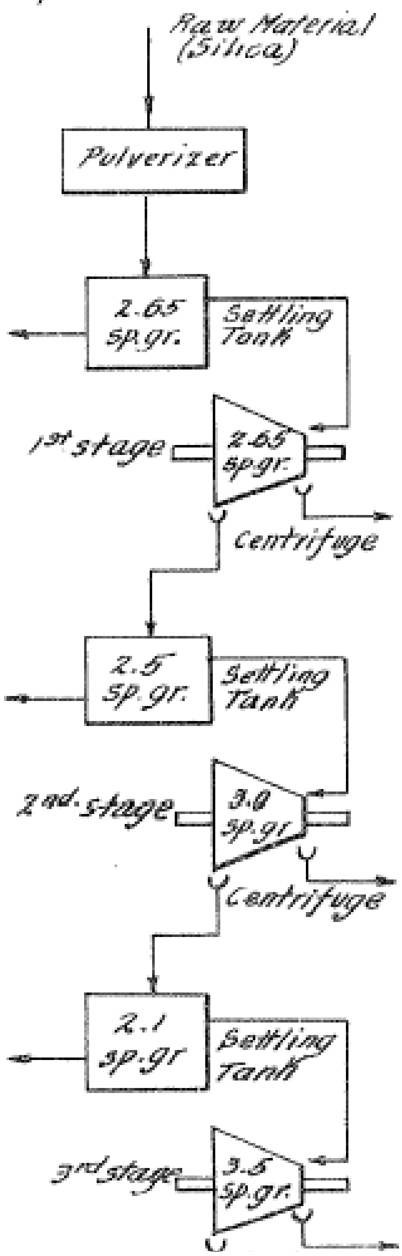


Figure 4 is a flow chart showing the steps in beneficiating materials containing lighter gravitational isotopes;

FIG. 4



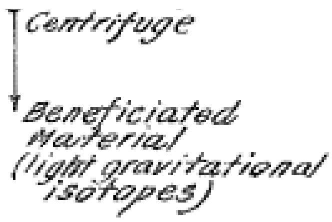


Figure 5 shows the steps in beneficiating materials containing the heavier gravitational isotopes;

FIG. 5.

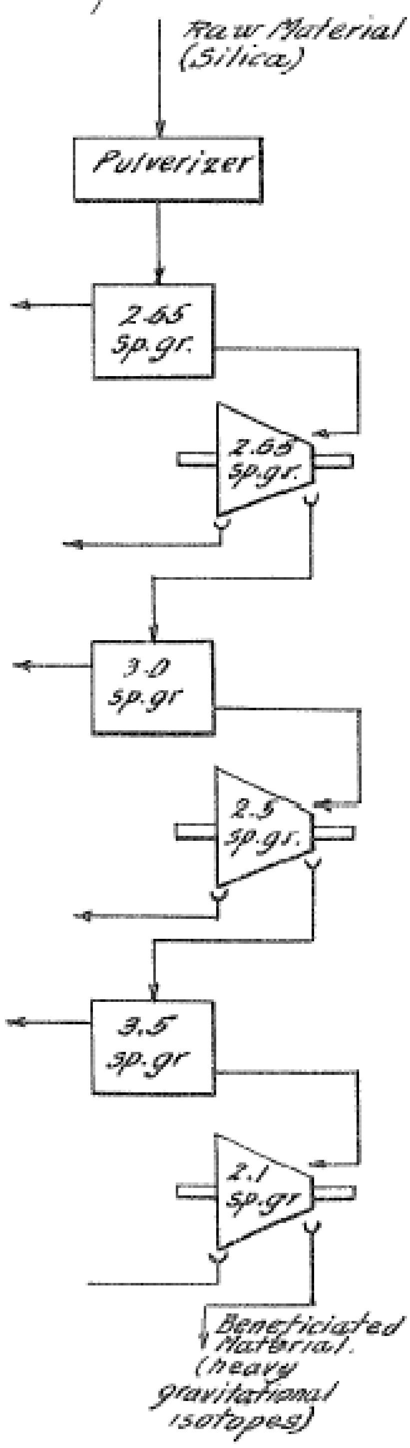


Figure 6 is a view in elevation, diagrammatic in character, illustrating a control device sensitive to gravitational forces but insensitive to acceleration;

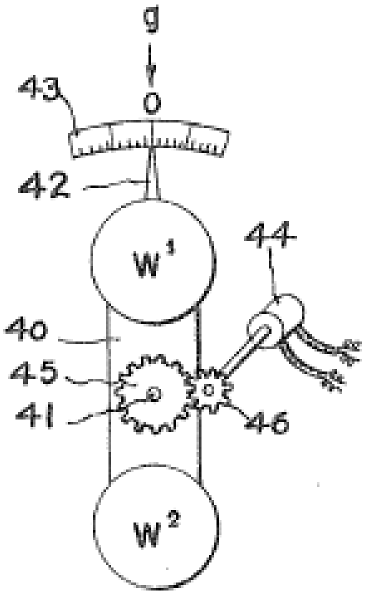


Fig. 6

Figure 7 is a view similar to Figure 4 illustrating a device responsive to inertial forces but insensitive to gravitational forces;

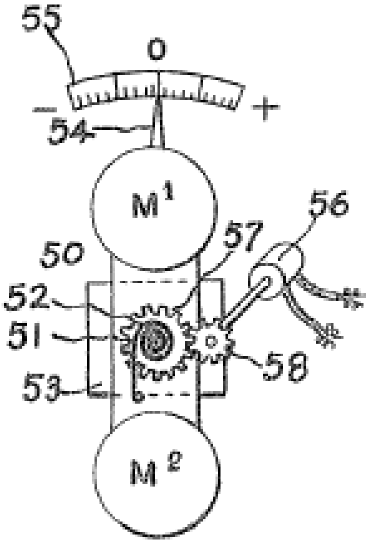


Fig. 7

Figure 8 illustrates a stable vertical meter of the total immersion type in accordance with principles of this invention;

FIG.8

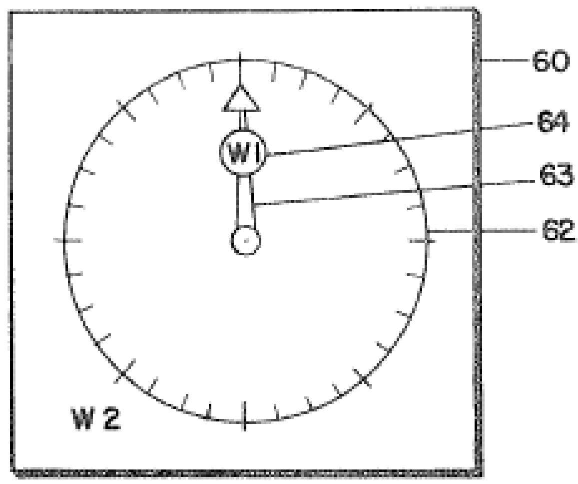


Figure 9 illustrates a gravity meter of the immersion type in accordance with principle of this invention; and

FIG.9

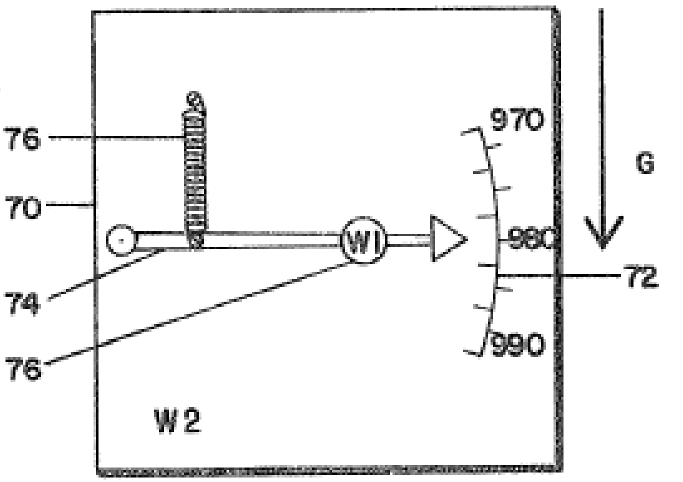
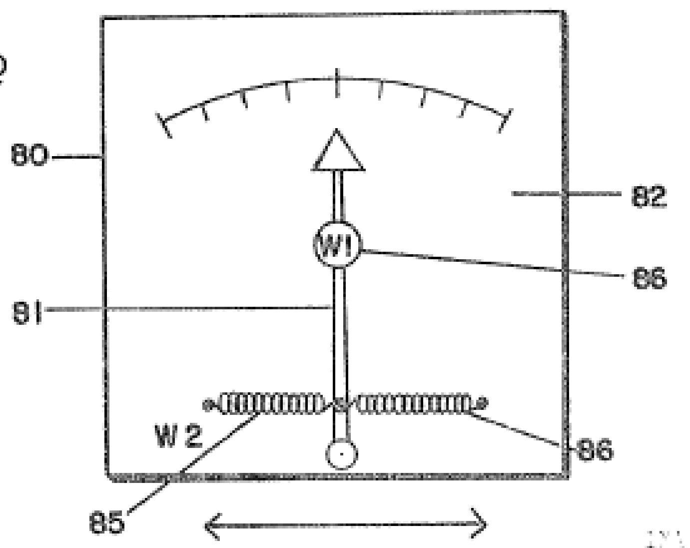


Figure 10 illustrates an immersion type accelerometer in accordance with principles of this invention.

FIG.10



The gravitational separating step is represented in Figure 1A by the chamber 10 containing a fluid 12, such as a mixture of water and thallium formate having a density of, for example, 2.65, in which the powdered materials selectively settle. Particles of higher gravitational mass comprising particles of the normal composition and high density impurities, represented by the heavy dots 14, settle more rapidly and there is, therefore, a greater concentration thereof in the lower layers of the settled materials. In the upper half of the layer and in the material which just floats, there is a greater concentration of the lighter isotopes of the composition (represented by small dots 16) and lower density impurities (represented by small dots 18). The upper layer 20 is illustrated on a larger scale in Figure 2. Of course, the separation between upper and lower halves of the layer is not sharp, each containing some entrapped material which belongs in the other half.

In Figure 1B is depicted the centrifuging step which may proceed or follow the gravitational step illustrated in Figure 1A. As depicted therein, four enclosed cups 24 are secured to arms 26 and 28 and rotated about a point 30. The material from layer 20 (in Figure 1A) is inserted into cups 24 in fluid having the same density as that employed in the step of Figure 1 and rotated to further the separation of the different masses.

The diagram of Figure 3 represents the relation of particles in a centrifuge cup upon completion of the first centrifuging step. The lower inertial mass impurities (represented by the small circles 18 and lower inertial mass isotopes represented by dots 16) are more concentrated in the upper layer. The bottom layer comprises the higher inertial mass materials including the relatively small amount of gravitationally lighter isotopes (represented by the small dots 16). The bottom layer may be subjected to a sequence of alternate sedimentation and centrifuging steps.

To obtain lighter gravitational isotopes, as shown in Figure 4, each subsequent sedimentation step is carried out in fluids of progressively lower specific gravity, while each subsequent centrifuging step is carried out in fluids of progressively higher specific gravity. Conversely, as shown in Figure 5, to obtain progressively higher gravitational isotopes, each subsequent sedimentation step is carried out in fluids of progressively higher specific gravity, while each subsequent centrifuging step is carried out in fluids of progressively lower specific gravity. This process is continued to as many stages as may be necessary to secure the desired amounts of the various gravitational isotopes.

In some instances, the so-called discarded fractions obtained in the settling steps may be recycled to obtain a higher recovery. Recycled materials ordinarily will require a larger number of settling and centrifuging steps than the original material to obtain a desired isotope concentration, because of the initial lower concentration of isotopes in the recycled material.

It should be understood that commercial settling and centrifuging apparatus may be employed to obtain continuous instead of batch beneficiation.

As stated above, in the case where the desired isotopes are gravitationally lighter than the normal material, the lighter fraction in the settling step and the more massive fraction in the centrifuging step is retained. In the case where the desired isotopes are gravitationally heavier than the normal material, the heavier fraction in the settling step and the less massive fraction in the centrifuging step is retained. Gravitational isotopes appear to be characterized by continuous emission or absorption of heat and a temperature higher or lower than the surrounding materials.

Concentrated gravitational isotopes lighter than the normal material, such as those derived from Sandusky or other clays, other complex silicates, cobalt-nickel silicates, etc., have two useful properties: (1) spontaneous generation of heat, and (2) lower gravitational mass (or weight) than normal material.

In Figure 6, an inertially balanced system is represented by two identical inertial masses W1 and W2 rigidly connected by connector 40 and balanced about a pivotal point 41 (to which the connector 40 is pivoted) and about which the system is adapted to rotate. The two inertial masses being equal, such a system is insensitive to inertial forces generally. However, weight W1 has less gravitational mass than W2 ad, therefore, the system responds to the earth's gravitational field and assumes an orientation (gravitational vertical) with respect to the earth. The difference in weight (with identical inertial masses) is effected by using one (or more) of the aforesaid isotopes. If it be lighter in weight than the normal substance, it is employed for weight W1, but if it be an isotope heavier than the normal substance, it is employed for the weight W2; or both light and heavy isotopes may be employed for weights W1 and W2 respectively. In concentrated form, there is enough difference in weight between identical inertial masses W1 and W2 to provide a moment (of force) sufficient to cause the system to respond to the earth's gravitational field and establish a stable vertical which remains stable despite inertial forces.

As illustrated in Figure 6, the system is advantageously provided with a pointer 42 moving with the system, and a stationary scale 43 (stationary relative to the aircraft or missile in which the device is installed) to indicate inclination of the latter with respect to the stable vertical. A telemetric device, here shown in the form of a Selsyn motor 44, may be employed to give a remote indication or exert remote control responsive to the position of the stable vertical on scale 43. The position of the system is translated to the Selsyn motor in this case by gear 45 fixed to connector 40 concentrically with pivot 41 and meshed with gear 46 on the Selsyn motor shaft. Any other suitable telemetric device may be employed for the foregoing purposes.

In the control device sensitive to inertial forces illustrated in Figure 7, a similar system employing opposed weights is employed. In this instance, however, the weights M1 and M2 must have the same gravitational mass (so as to be balanced as regards the force of gravity) but of different inertial masses so as to be unbalanced and, therefore, sensitive to inertial forces. Weights M1 and M2 are carried in opposite relation on connector 50. The latter is pivoted to and oscillates about pivot point 51. A spring or springs 52 bias the system to return to a neutral position (representing absence of acceleration or centrifugal force). A suitable damping device 53 may be used to reduce or prevent hunting or "overshooting". A pointer 54 carried by the system indicates on the stationary scale 55 the degree of deflection of the system in either direction (in response to inertial forces) from the zero or neutral position on the scale. If there be no acceleration or centrifugal force acting on the system, the spring 52 returns it to neutral or zero position.

The weights M1 and M2 are given different inertial masses, though having identical gravitational masses by constituting one (or both) of the weights with gravitational isotopes. Equal weights of the normal substance and its gravitational isotopes or equal weights of light and heavy isotopes will have different inertial masses. It is immaterial whether the greater mass be M1 or M2. In either case, the system will be unbalanced as regards the forces of inertia, but balanced as regards the forces of the earth's gravitational field. Under acceleration, deceleration or centrifugal force, the greater mass will control and overbalance the lesser mass against the restraining force of spring 52 and deflect the system in accordance with the degree of acceleration, deceleration or centrifugal force.

A Selsyn motor 56 or other telemetric device may be coupled with the system by gears 57 and 58 as in the device of Figure 6 to give remote indication of the deflection of the device and/or to actuate remotely located instrumentalities controlled thereby.

Referring now to Figure 8, there is depicted a meter of the immersion type for indicating a stable vertical. In this meter, an enclosed container 60 contains a suitable fluid. Mounted within the container is a dial 62 and a pointer 63 pivotally mounted on the center of the dial 62. Pointer 62 has a concentrated mass 64 mounted intermediate its length, which mass may advantageously contain material bearing beneficiated isotopes of the type previously described. The top of container 60 comprises transparent material so that the scale may be readily seen. The fluid bears a relationship to the mass 64 such that the fluid and mass have the same inertial mass but the concentrated mass 64 has a lower gravitational mass. Therefore, the system is inertially symmetrical and gravitationally asymmetrical. The pointer 63 will, therefore, respond preferably to a gravitational field, always aligning itself in the zenith-nadir direction.

In Figure 9, there is illustrated another embodiment of this invention for indicating the acceleration of gravity. As herein depicted a container 70 having a transparent wall has a suitable fluid contained therein. A scale 72 calibrated in acceleration is secured to container 70 and indicating arm 74 is pivotally mounted in the container and its position is biased by means of spring 76 connected between the scale 72 and the indicating arm 74. Mounted on arm 74 is mass 76. Advantageously, the mass 76 is inertially symmetrical with respect to the fluid surrounding the meter and filling the container 70. The mass 76 is gravitationally asymmetrical with respect to the fluid. Thus, the gravity meter will be insensitive to inertia, but will indicate the force of gravity even though the container 70 may be moving under an accelerating force.

Referring now to Figure 10, there is depicted an accelerometer in accordance with this invention. In this device a container 80, having one transparent wall, contains suitable fluid, an indicating scale 82, an indicator 84, and a pair of springs 85 and 86 supporting the indicator 84 at the mid-point of the scale 82. Indicator 84 has mounted thereon a mass 86. Mass 86 bears a relationship to the fluid such that they are gravitationally symmetrical while being inertially asymmetrical. By biasing the indicator 84 at the midpoint of the scale 82, the indicator 84 will indicate acceleration in either direction transversely of the meter, as shown in Figure 10. This meter will be insensitive to gravity since the mass 86 is gravitationally symmetrical with respect to the fluid. It is, of course, understood that this accelerometer may be operated in any position without showing a static effect.

It is to be understood that the devices in Figures 8, 9, and 10 exhibit one definite additional advantage in that they are all highly damped by the fluid in the containers.

It is also to be understood that in the discussion of Figures 8, 9, and 10 the isotopes are contained in the concentrated masses 64, 76 and 86. It is entirely possible, however, to achieve the same inertial and gravitational relationships by suspending, mixing or compounding the isotopes in the fluid rather than employing them as concentrated masses. If isotopes are added to the fluid then the concentrated masses will not contain gravitational isotopes or may contain isotopes of the opposite sense, i.e., lighter or heavier.

Telemetric systems such as are commonly used in aircraft or missile guidance, similar to those shown in Figures 6 and 7, may be employed with any of the above total immersion devices for transmission of data.

While I have shown and described various embodiments of my invention, it is understood that the principles thereof may be extended to many and varied types of machines and apparatus. The invention therefore is not to be limited to the details illustrated and described herein.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

(1) A method of beneficiation of material containing gravitational isotopes which comprises the steps of alternately settling and centrifuging said material while suspended in a fluid, selecting one extreme component in the settling stage and repeating successive steps of settling and centrifuging until a material having the desired concentration of gravitational isotopes is obtained, each subsequent settling step being conducted in a fluid of progressively different specific gravity, each subsequent centrifuging step being conducted in a fluid of progressively different specific gravity, the direction of progression of specific gravities of the fluids in the settling steps being in directions opposite each other.

(2) A method for beneficiation of material containing light gravitational isotopes which comprises the steps of alternately settling and centrifuging said material while suspended in a fluid, selecting the lighter and then the more massive components from the settling and centrifuging steps, respectively, and repeating successive steps of settling and centrifuging until a material having the desired concentration of lighter gravitational isotopes is obtained, each subsequent settling step being conducted in a fluid of progressively lower specific gravity, each successive centrifuging step being conducted in a fluid of progressively higher specific gravity.

(3) The method of beneficiation of material as claimed in Claim 2 wherein the step of finely dividing said materials precedes the remainder of the steps.

(4) A method for beneficiation of material containing heavy gravitational isotopes which comprises alternately settling and centrifuging said material while suspended in a fluid, selecting the heavier and then the less massive components from the settling and centrifuging steps, respectively, and repeating successive steps of settling and centrifuging until a material having the desired concentration of heavier gravitational isotopes is obtained, each subsequent settling step being conducted in a fluid of progressively higher specific gravity, each subsequent centrifuging step being conducted in a fluid of progressively lower specific gravity.

(5) The method of beneficiation of material as claimed in Claim 4 wherein the step of finely dividing said materials precedes the remainder of the steps.

(6) A method for separating materials of different weight-to-mass ratios comprising the steps of alternately settling and centrifuging said material while suspended in a fluid, selecting one extreme component in the settling stage and the opposite extreme component in the centrifuging stage and repeating successive steps of settling and centrifuging until a material having the desired concentration of gravitational isotopes is obtained, each subsequent step being conducted in a fluid of progressively different specific gravity, the direction of progression of specific gravities of the fluid in the settling steps and in the centrifuging steps being in directions opposite each other.

(7) A method for separating material of different weight-to-mass rations, said material containing light gravitational isotopes, which comprises the steps of alternately settling and centrifuging said material while suspended in a fluid, selecting the lighter and then the more massive components from the settling and centrifuging steps, respectively, and repeating successive steps of settling and centrifuging until a material having the desired composition of lighter gravitational isotopes is obtained, each subsequent settling step being conducted in a fluid of progressively lower specific gravity, each subsequent centrifuging step being conducted in a fluid of progressively higher specific gravity.

(8) The method of beneficiation of material as claimed in Claim 7 wherein the step of finely dividing said materials precedes the remainder of the steps.

(9) A method for separating material of different weight-to-mass ratios, said material containing heavy gravitational isotopes, which comprises alternately settling and centrifuging said material while suspended in a fluid, selecting the heavier and then the less massive components from the settling and centrifuging steps, respectively, and repeating successive steps of settling and centrifuging until a material having the desired concentration of heavier gravitational isotopes is obtained, each subsequent settling step being conducted in a fluid of progressively higher specific gravity, each subsequent centrifuging step being conducted in a fluid of progressively lower specific gravity.

(10) The method of beneficiation of material as claimed in Claim 9 wherein the step of finely dividing said materials precedes the remainder of the steps.

(11) A method of separating lighter (or heavier) gravitational isotopes from a material comprising the steps of: mixing the isotope containing material with a fluid having a first specific gravity such that a portion of said isotope containing material

floats (or sinks); removing said portion and centrifuging said portion; removing the more massive (or less massive) portion of said centrifuging step; alternately repeating said settling and centrifuging steps; each of said settling steps after the first being conducted in a fluid having a specific gravity progressively different from that of the fluid employed in the previous settling step; each subsequent centrifuging step being conducted in a fluid having a specific gravity progressively different from that of the fluid employed in the previous centrifuging steps, the direction of progression of the specific gravities of the fluids in the successive centrifuging steps being opposite to the direction of progression of the specific gravities of the fluids in the successive settling steps.

Method for Producing Gravitationally-Anomalous Materials

(April 1, 1973)

Thomas Townsend Brown

The method relates to the process by which certain materials are made to lose weight and become anomalously light. Certain susceptible material, including complex silicates, aluminates and clays, and certain rare-earth (and other) elements, when processed, actually decrease in weight. The result is not only a real loss of weight; such materials suffer a retardation in gravitational acceleration (value of g) to an appreciable extent. This abnormal lightness, in many instances, is not permanent but tends, in time, to disappear, so that eventually the weight returns to normal.

While being processed, as described herein, materials lose weight, rapidly at the start and then more slowly as processing continues, reaching a minimum (asymptotically) depending upon the energy available in processing.

When this point is reached and processing is discontinued, the weight of the processed materials beings immediately to regain weight, rapidly at first and then more and more slowly as time goes on, again reaching normal weight asymptotically.

Heat is given off spontaneously as this recovery takes place, the temperature differential (with the ambient) being greatest at the start of the recovery and then diminishes to zero as the weight of the material approaches normal.

The present commercial use of materials having anomalous weight or lightness would appear to be, in the main, as materials of construction for spacecraft or the like. A further use, resulting from the lowered gravitational acceleration (g) is anticipated in astro-navigational instruments, as gravitic dipoles, in gravity vector sensors and inertial guidance systems for spacecraft.

The exothermal characteristics make the processed materials (as described herein) useful in several additional practical applications and this will be the subject of a further patent application.

The scientific reasons for the loss of weight are not clearly understood at the present time. The phenomenon appears to reside in the outer electronic shells of the excited atoms, not the nuclei. Hence, the inertial mass probably is not affected. If abnormal lightness is the result of an excited state, meaning the addition of energy, then the inertial mass will certainly be increased, but almost infinitesimally. Indeed, this would seem to be anticipated by the equation $E = mc^2$, where E represents the total contained energy and m represents the inertial mass of the material.

In any event, the long-accepted "postulate of equivalence" (inertial mass being equal to gravitational mass) must be abandoned in attempting to explain the phenomenon described here. Apparently this surprising action is a new form of atomic excitation, undiscovered and not even theoretically predicted. The situation is so baffling that no further discussion of theory can be attempted at the present time.

The method of excitation specifically set forth in this disclosure utilizes mechanical friction only. It is termed "tribo-excitation". Other methods of gravitic excitation appear to be possible and, as they are developed, will be the subjects of additional patent applications.

Tribo-excitation for the production of gravitationally-anomalous materials can be accomplished in several different but related ways, such as:

(1) Vigorous shaking of granular materials -- inter-particle (Coulomb) friction.

(2) Grinding or pulverizing -- cleavage and intra-particle friction.

(3) Sand blasting -- scouring, abraiding, spalling or ablating.

(4) Physical deformation -- compressing, tensing, bending -- inter-molecular friction.

All of the above methods are essentially frictional. The mere "rubbing together" off pieces of susceptible materials, either alike or different, causes "tribo-excitation". Materials which are energetically excited in this way become gravitationally lighter. As stated earlier, this excitation and its resultant lightness is not permanent but eventually disappears. As the excitation decays, the weight increases, returning to normal eventually. During this return, the material is warmer than its environment and the energy of excitation escapes as heat.

Referring to the accompanying drawings, the apparatus to accomplish this frictional method of excitation may takes, but is not necessarily limited to, the following forms:

Figure 1 is a motor-driven mechanically-eccentric shaker.

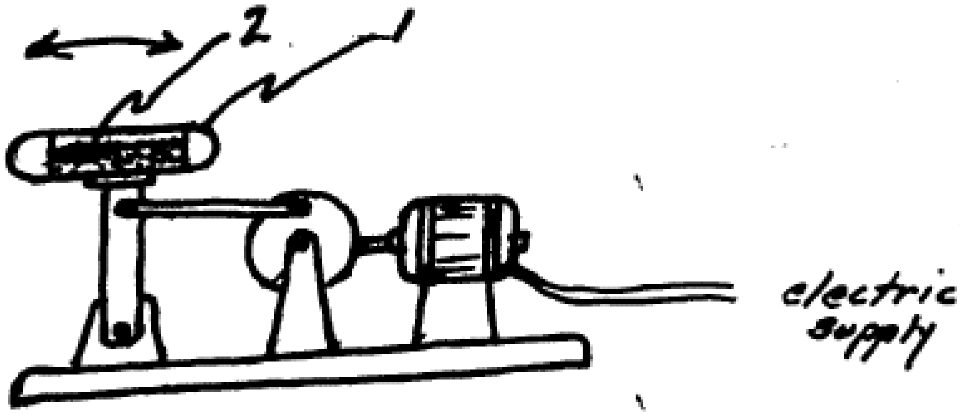


Fig. 1.

Figure 2 illustrates a shaking device driven by an electromagnetic vibrator.

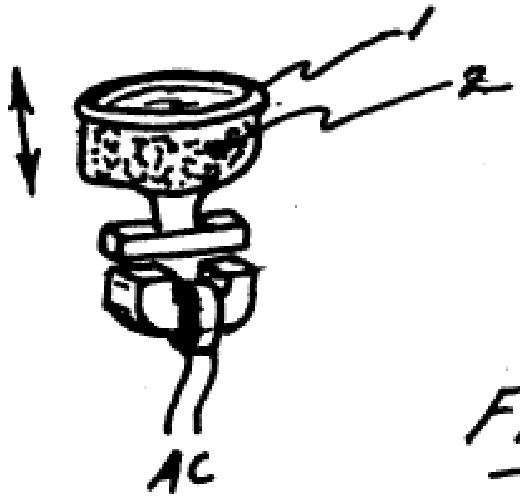


Fig. 2.

Figure 3 shows a similar shaking device driven by a magnetostricitve or electrostrictive transducer at ultrasonic frequency.

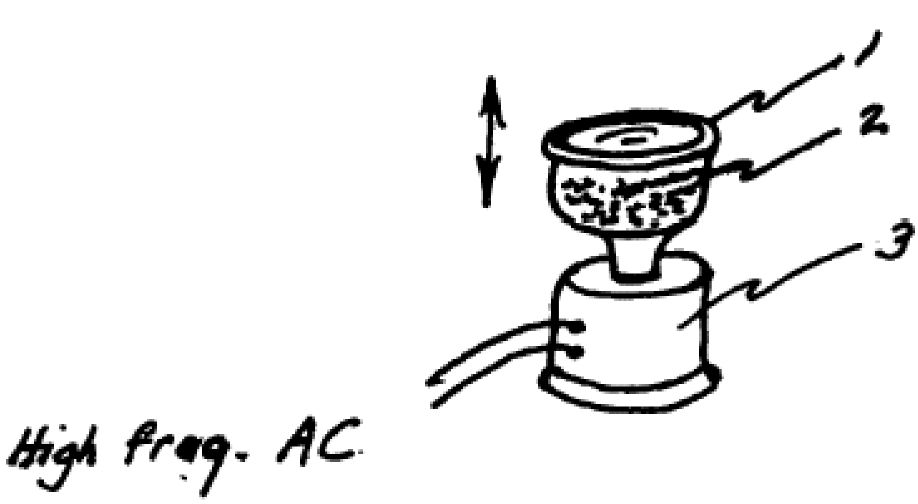


Fig 3

Figure 4 is a motor-driven ball mill or grinder.

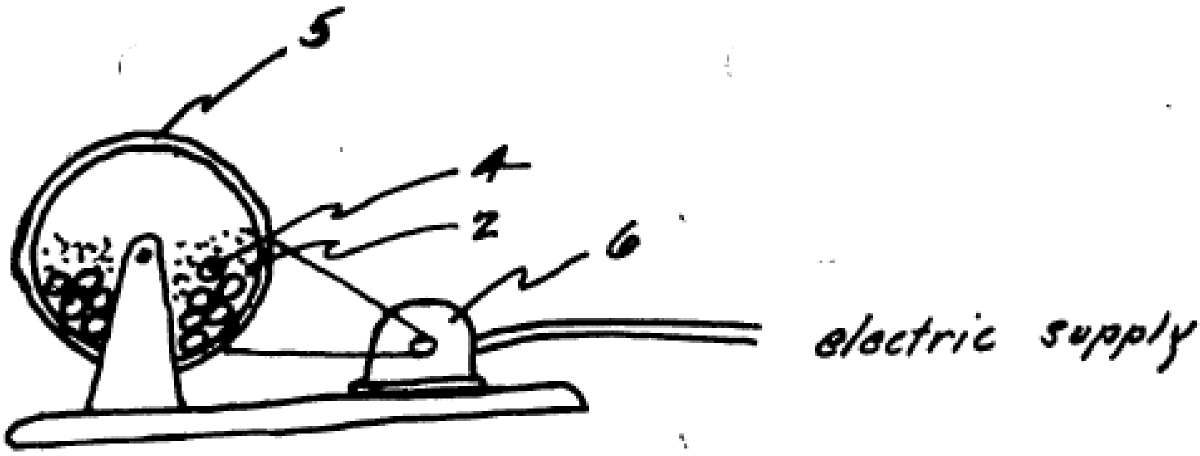


Fig. 4.

Figure 5 is a motor-driven sanding machine.

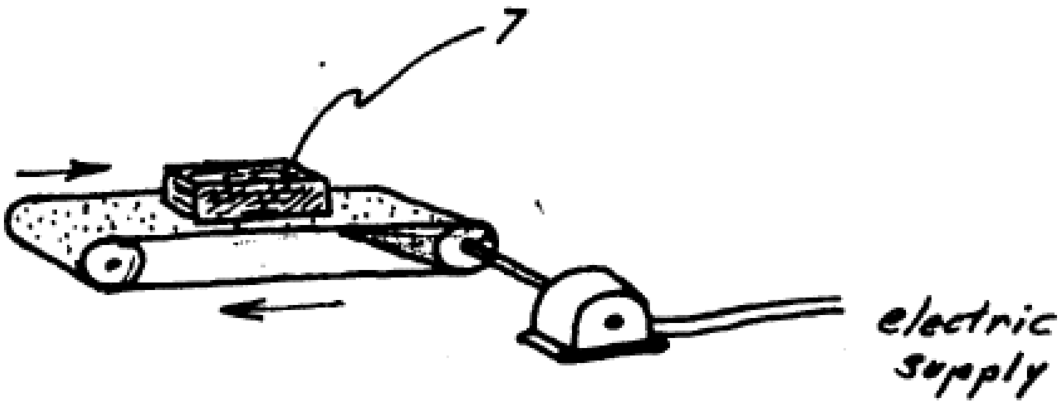


Fig. 5.

Figure 6 is a sand-blasting arrangement.

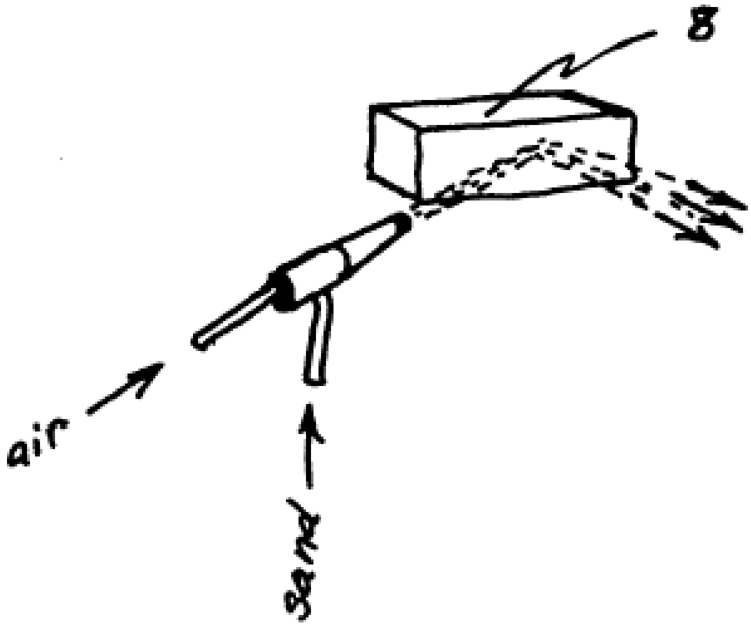


Fig. 6.

Referring to these drawings in detail:

Figure 1 shows the simplest form of shaker. It may be a paint-shaker such as that used in a paint store. Container 1 preferably is made of glass or porcelain (for technical reasons not disclosed). The contents 2 may be aluminum silicate (clays), barium aluminate, ytterbium or other rare earth powders, tantalum powder, loess, monazite sand, bauxite or other ores.

In prototype tests, container 1 is filled with material 2 to be excited. It is hermetically sealed to prevent leakage and is carefully weighed. It is then vibrated 30 to 50 minutes, removed from the shaker and weighed again, container and contents together.

Figure 2 illustrates a type of electromagnetic vibrator to accomplish the same result as in Figure 1.

Figure 3 illustrates a vibrator powered by magnetostrictive or electrostrictive ultrasonic transducers. The high frequency of vibration, over and beyond that possible in the apparatus of Figures 1 and 2, provides greater energy of excitation, and thus causes a further loss of weight than that possible with the apparatus having lower frequency of vibration.

Figure 4 shows a slightly different form of excitation apparatus: a grinder. The grinder shown is a ball mill. The balls 4 may be steel, porcelain, or tantalum, depending upon the degree of excitation required. Jar 5 should preferably be made of porcelain. The mill is rotated by motor 6.

Figure 5 shows a still different form of apparatus: a sanding machine. The method here is to grind or abraid the surface of a susceptible solid 7, such as granite, sandstone, porcelain or the like so as to cause it to become excited.

In Figure 6 the same idea is set forth as in Figure 5, except that grinding or abrasion is accomplished by sand blasting. Sand is blown by compressed air at high velocity against target (susceptible) material 8, causing the material to become gravitically excited.

In both Figures 5 and 6, the ablation fragments and impact ejecta may be gravitically excited after impact, and this material may also be collected and utilized.

While in the foregoing, inter-particle friction has usually resulted in loss of weight, it is conceivable that in certain distances, depending upon the materials used (especially light components) a gain in weight may sometimes be observed and possibly utilized. Hence, in the appended claims, any alteration of weight lies within the intended scope of the invention.

I claim:

(1) Method for producing gravitationally-anomalous materials consisting in containing a volume of loosely-held particles thereof, vibrating said contained volume and utilizing the resultant inter-particle friction to produce gravitationally-anomalous material.

(2) Method for producing lighter-than-normal material consisting in loosely holding together a volume of particles thereof, vibrating said volume and utilizing the inter-particle friction to produce a loss of weight of said material.

(3) Method for inducing a loss of weight in a material consisting in holding the particles thereof in frictional contact, rubbing said particles together by mechanical shaking and utilizing the resultant inter-particle friction to cause loss of weight of said material.

(4) Method of controlling the effect of gravity upon two or more masses, consisting in placing said bodies in physical contact, moving said masses with respect to each other and utilizing the resultant friction to alter the weight of said masses.

(5) Method for causing two material bodies to become gravitationally lighter consisting in placing said bodies in physical contact, energetically rubbing said bodies together and utilizing the resultant inter-body friction to cause loss of weight of said bodies.

(6) Method for altering the weight of particulate matter consisting in containing the particles thereof, providing inter-particle vibration and utilizing the resultant inter-particle friction to alter the weight of said matter.

(7) Method for reducing the weight of material consisting in subjecting said material to grinding forces so inter-grain cleavage and friction results, continuing said grinding for a period of time and utilizing the cumulative effects of said grinding to affect the weight of said material.

(8) Method of controlling gravitation as it affects matter consisting in energetically crushing said matter, continuing said crushing for a period of time and utilizing the cumulative effects of said crushing to affect the weight of said matter.

(9) Method of altering the combined weight of two solids consisting in rubbing one

of said solids against the other, continuing said rubbing for a period of time and utilizing the resultant friction to alter the combined weight of said solids.

(10) Method of altering the combined weight of two solids consisting in accelerating one of said solids toward and against the other of said solids, causing the impact to produce friction and utilizing said friction to alter the combined weight of said solids.

(11) Method of altering the weight of a mass consisting in directing a high velocity molecular jet toward and against said mass, causing the impact to produce impact friction upon the surface of said mass and utilizing said impact friction to alter the weight of said mass.

(12) Method according to Claim 1, including means to energetically vibrate said materials over a period of time.

(13) Method according to Claim 8 including such as a ball mill.

(14) Method according to Claim 10 including sand blasting means.

(15) Method according to Claim 11 including a high velocity jet of gas or liquid.

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