

down in a third linear degree of freedom separate from the first and second linear degrees of freedom of said six degrees of freedom;

said controller including a move down sensor and a move up sensor each associated with said third linear degree of freedom of said six degrees of freedom;

said move down sensor associated with  
an eleventh output of said twelve orthogonal outputs;  
said move up sensor associated with  
a twelfth output of said twelve orthogonal outputs.

<sup>10</sup>  
~~10~~ A controller in accordance with claim ~~32~~ wherein each sensor of said twelve separate sensors is an electrical contact switch with the contacts in an open position and being closeable with force.

<sup>11</sup>  
~~12~~ A controller in accordance with claim ~~33~~ further including  
spatial isolation means in association with each switch of the twelve switches.

<sup>12</sup>  
~~13~~ A controller in accordance with claim ~~34~~ further including tactile feedback means for providing vibration which can be felt through said handle.

<sup>14</sup>  
~~30~~ A hand-operated controller allowing six bi-directional degrees of freedom of hand input force into a single handle, said controller comprising;  
said single handle movably supported by  
means for converting hand input force applied in any direction to said single handle into movement of said single handle in a direction substantially identical to the hand input force direction and relative to  
a stationary support base of said controller; whereby linear hand input force against said single handle absent rotational

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force can move said single handle purely linearly, and rotational hand input force against said single handle absent linear force can move said single handle purely rotationally;

linear sensor means for sensing only linear movement of said single handle and producing electrical output signals indicative of linear hand input force direction against said single handle;

rotational sensor means for sensing only rotational movement of said single handle and producing electrical output signals indicative of rotational hand input force direction against said single handle.

<sup>15</sup> 37. An improved hand operated controller of the type allowing six degrees of bi-directional freedom of hand inputs for conversion of the hand inputs into electrical outputs;

wherein the improvement comprises the use of a separate and distinct sensor for each direction of each bi-directional degree of freedom of said six degrees of freedom; whereby twelve separate and distinct sensors are utilized for converting hand inputs into said electrical outputs.

<sup>16</sup> 38. An improved six degree of freedom controller in accordance with claim <sup>15</sup> wherein each sensor of the twelve sensors is an electrical contact switch.

<sup>17</sup> 39. An improved six degree of freedom controller in accordance with claim <sup>16</sup> further including tactile feedback means for providing vibration to be felt by a hand operating said controller.

<sup>18</sup> 40. A controller in accordance with claim <sup>17</sup> further including

spatial isolation means in association with each switch of the twelve switches.

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Amendments to the specification:

On page 3 of the specification, under the heading "Objects and Advantages", line 24 following "Virtual "action".", please insert the following as sentences:

As will become appreciated with reading detailed descriptions explaining structures in accordance with the present invention and with an examination of the drawings, in order to ideally intuitively manipulate objects and/or navigate a viewpoint such as within a three-dimensional Virtual Reality display or like computer display using a hand-input full six degrees of freedom controller, it is desirable to use a hand input controller which allows all of the six degrees of freedom to all be input directly into the controller through a single handle. Additionally, a truly intuitive 6-DOF controller having all inputs through the single handle is one which allows the hand inputs against the handle to move the controller handle and also preferably the object (or viewpoint) on the display only (exclusively or purely) in the direction of the hand input force against the handle. For example, if the user viewing a selected object wishes to rotate the object clockwise, then the user would ideally need only apply clockwise rotational force to the handle, and ideally the handle and preferably the object would both only rotate clockwise, not moving linearly or about another axis in some direction not intended by the user which would be confusing to the user. Such a relationship of the handle and preferably also the object of the display moving only in the direction of hand input force against the handle would ideally be true for all of the six degrees of freedom. To be truly intuitive, i.e., not confusing to the user, the direction of the hand input force against the handle moves the handle and preferably also the object of the display only in the direction of the force applied to the handle, and to provide such a controller is an object of the present invention. A truly intuitive full six degrees of freedom controller essentially, at least from one view point, allows a

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direct link between the user's mind, hand, 6-DOF controller and object or viewpoint in the display.

On page 4, line 12 between "eliminates" and "error" please insert --potential--.

On page 4, line 15 between "signals" and the "." (period), please insert --which might otherwise be caused by the vibration of the tactile feedback falsely triggering sensors--.

On page 4, line 20 between "outputs" and the "." (period), please insert --or electrical output signals--

On page 4, line 21 between "orthogonal" and "outputs", please insert --mechanical--.

On page 4, line 21 after "outputs,", please insert --wherein twelve sensors are preferably used, one sensor per each of the twelve orthogonal mechanical outputs,--.

On page 4, line 22 after "components.", please insert the sentences --The twelve orthogonal mechanical outputs equal a first, a second, a third, a fourth on up through a twelfth mechanical output, with these representing and corresponding to the twelve orthogonal movements of true and full six degrees of freedom bidirectionally of three mutually perpendicular axes. The advantages of mechanically translating full 6-DOF into twelve orthogonal mechanical outputs of the controller are numerous, and include ease in applying a separate sensor to each of the twelve outputs, and applying spatial sensor isolation means to each of the twelve sensors, which in turn provides forgiveness for human hand inaccuracies and further allows ease in effective use of substantial vibration as tactile feedback without falsely triggering sensors. Another advantage of mechanically

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translating full 6-DOF into twelve orthogonal mechanical outputs is that it allows for a much wider range of sensor types to be utilized, including very inexpensive open/close contact switches or many other types of more sophisticated sensors.--

On page 6, line 4 between "movement" and the "." (period), please insert ~~-~~of the handle relative to a stationary base or support base--.

On page 6, line 16 following "three dimensions.", please insert the following sentences: ~~-~~As those skilled in the art understand, true full six degrees of freedom inherently includes three linear degrees of freedom and three rotational degrees of freedom, with these being simplistically described as two horizontal linear degrees of freedom perpendicular to one another, and a third linear degree of freedom being a vertical linear degree of freedom wherein the horizontal first and second linear degrees of freedom are mutually perpendicular to the third linear degree of freedom, and with the first, second and third linear degrees of freedom being describable in terms of three axes all mutually perpendicular to one another and intersecting one another at a point. The three rotational degrees of freedom inherent to true full 6-DOF are rotations about or within these three mutually perpendicular axes. Also inherent to true full 6-DOF is the ability to move along linearly (translationally) and about (rotationally) these three mutually perpendicular axes bidirectionally and orthogonally. In the above simplistic description using the terms "horizontal" and "vertical" axes of the 6-DOF, the horizontal and vertical hypothetical positioning would be most commonly used and assumed here on Earth when manipulating an object or viewpoint of a display, however these three mutually perpendicular axes may of course be tilted from horizontal and vertical as would be the case in outer space.--

On page 6, line 25, between "embodiment" and the ".", please

insert --and showing one single handle above the base--.

On page 10, line 18 between "sensor" and "is", please insert --, being a separate and distinct sensor,--. The amended sentence should read: "Each sensor, being a separate and distinct sensor, is distinctly associated with....".

On page 10, line 19 between "orthogonal" and "output", please insert --mechanical--.

On page 11, line 3, after "sensor 184.", please insert the sentences - The move forward, move back, move right, and move left sensors may singularly or jointly be referred to as linear sensors, linear force sensors, linear sensing means, linear force sensing means, or linear position sensors or linear position sensor means, as these first four sensors are used to sense the positions, and with some types of useful sensors, the force against also, of sliding-plate-linear-conversion means as it moves in a horizontal first linear degree of freedom, and in a horizontal second linear degree of freedom of the six degrees of freedom. Sliding-plate-linear-conversion means moves exclusively horizontally as determined by it being sandwiched between first and second portions of the base assembly 214 as will become more appreciated with continued reading.--

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On page 11, line 5 after "shelf 216", please insert --, preventing downward movement,--.

On page 11, line 8 following "actuator 352.", please insert --The top 215e and retaining shelf 216 of base assembly 214 may be called or referred to as first and second portions respectively, and in figure 2 it can be seen that top 215e is parallel to horizontal retaining shelf 216 and is thus horizontal also. Thus it can be ascertained from the drawings and the additional descriptions that sliding-plate-linear-conversion

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means is sandwiched horizontally and that plates 350 and 352 exclusively slide or move horizontally within the first and second horizontal linear degrees of freedom to actuate the first four linear sensors 178, 180, 182 and 184.--

On page 11, line 24, between "Shaft 102" and "extends", please insert --, or at least a lower end thereof,--.

On page 11, line 27 (last line), between "224," and "a move up sensor", please insert --two independent sensors 186, 188,--

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On page 12, line 2, after "sensor 188.", please insert --From drawing figures 1 and 2, and from this disclosure as a whole, it can be appreciated that shaft 102 is coupled to sliding-plate-linear-conversion means or the sliding actuator plates assembly 348 to move with sliding-plate-linear-conversion means at least in the horizontal first and second linear degrees of freedom. It can also be ascertained from the drawings and from these writings that shaft 102 is not operably tiltable, or in other words is not significantly or substantially tiltable since such tilting in this particular embodiment is not needed to actuate any of the twelve sensors, and would lead to a far less intuitive six degree of freedom controller as will become more appreciated with continued reading. In Fig. 2, shaft 102 is shown non-tiltably supported by an engagement of significant length with lower shaft guide 224 and with lesser sliding plate actuator 352 of sliding-plate-linear-conversion means for example, and both of these engagements allow vertical sliding of shaft 102 in this example, and thus some clearance between the parts is required for the sliding, and the clearance theoretically might allow an insignificant amount of tilting of shaft 102, being undetectable by the eye and hand, but such clearance should be maintained very small to eliminate any detectable or operable tilting of shaft 102 for all practical purposes. In other words, significant tilting of shaft 102 in this embodiment is highly undesirable.--

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On page 13, line 13, between "four" and "sensors", insert --rotational or rotational force--.

On page 13, line 14 following "actuator 354.", insert --In this embodiment it can be appreciated from the previous descriptions and the drawings that six independent rotational force or movement sensors are used to sense rotations or rotational force within the three, i.e. first, second and third rotational degrees of freedom of movement or force against the single handle 100, the single handle 100 being shown in drawing figures 1 and 2. It can also be appreciated six independent linear force or linear position sensors are used to sense linear movement or force of or against the single handle 100, i.e., first and second linear sensors for the first horizontal linear degree of freedom which the handle 100 and sliding-plate-linear-conversions means moves within; a third and fourth linear sensor for the second horizontal linear degree of freedom which the handle 100 and sliding-plate-linear-conversions means moves within, and a fifth and sixth sensor for the vertical or third linear degree of freedom along which handle 100 can move relative to base assembly 214.--

On page 14, line 8 between "along" and "the", please insert --or about--.

On page 14, line 17 between "directly" and "to", please insert --and correspondingly--.

On page 14, line 23 between "184." and "If", please insert --It is clear in the drawing figures 1 and 2, and from the above descriptions that shaft 102 is coupled to move with sliding-plate-linear-conversion means at least in the first and second horizontal linear degrees of freedom, and thus hand input force applied linearly against handle 100 corresponding to the first



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and second horizontal linear degree of freedom is transferred into shaft 102 and into said sliding-plate-linear-conversion means to move sliding-plate-linear-conversion means in the direction of the force applied by hand to handle 100.--

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On page 16, line 4, change "gooves" to --grooves--.

On page 20, line 15, change "form" to --from--.

On page 21, line 11, between "sensor" and "was", insert which is a normally open snap switch closeable with force applied thereto as indicated in the drawings,--.

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REMARKS

In the above amendments to the claims and specification, no

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new material has been added. No information has been added which was not in or very strongly and clearly implied in the writing or clearly shown in the drawings in the originally filed disclosure. No new physical properties, new uses, etc., have been added, thus no new matter has been added.

With the cancellation of claims 12-22, and the careful writing of the new claims 23-40, and with the amendments to the specification, the objection to the specification and claims under 35 U.S.C. 112 first paragraph is respectfully solicited to be withdrawn.

The new claims 23-40 are directed toward the embodiments essentially of drawing Figs. 1-8, 10 and 11; mostly toward the embodiment of Figs. 1-5, and not toward the inferior embodiment shown in Fig. 9.

The rejection of claims under 35 U.S.C. 102 over Dzholdasbekov is respectfully requested to be withdrawn and not applied or re-applied in view of the new claims 23-40, because Dzholdasbekov does not describe the invention per 35 U.S.C. 102 as currently claimed in any of the claims 23-40, and for the following specific reasons: There is no "point" within the Dzholdasbekov handle wherein three mutually perpendicular axes intersect one another, with sensors being applied to detect handle movement about each of these three axes as recited in independent claims 23, 32 and the claims which depend thereon whether directly or indirectly. The Examiner's comments pertaining to Dzholdasbekov and the theoretical point on page 15 part (d) of the Office Action has been considered, however is it clear from the Dzholdasbekov disclosure that there is no "point", real or theoretical, in the Dzholdasbekov handle wherein the three rotational axes which are monitored with pick-ups intersect one another mutually perpendicular to one another. The Dzholdasbekov shaft supporting the handle clearly is structured

to orbit about axis 23. Additionally, the thumbwheel 25 of Dzholdasbekov constitutes a second component other than a "single handle" as recited in the present claim 36 which must be manipulated to achieve three rotational degrees of freedom. With the Dzholdasbekov device, it is clear that the handle 2 is not resolvable in three "picked-up" or detected or sensed degrees of rotational freedom about a single point defined by three mutually perpendicular axes which intersect one another within the handle 2. Thus, the Dzholdasbekov disclosure does not describe the present claimed invention of claims 23-32, and thus the claims should not be rejected under 35 102 (b) over Dzholdasbekov based on the handle rotational aspects (in the least) as discussed above.

Additionally, the Dzholdasbekov device, as may best be understood from drawing figure 3 in conjunction with the writing of Dzholdasbekov, has an inherent design flaw due to the eccentric attachment of the shaft which supports and connects handle 2 to the rotary module 4. The shaft is shown cross sectioned in Fig. 3. It can be ascertained that if a translational move was desired straight toward the top of the drawing page, one would push on handle 2 and thus the shaft toward the top of the page. But in doing so, if the rotary module 4 rotated easily enough, before any translational motion or force could be applied to one of the lower translational module, the handle and shaft would "swing" toward the top of the page, rotating module 4 about axis 23, and the unintended rotation would be picked-up by rotary pick-up 24 and thus unwanted output signals would be sent to the "manipulator". Conversely and still with reference to the Dzholdasbekov Fig. 3, if one wanted to input counter-clockwise rotation within axis 23 to be picked-up through module 4 by pick-24, and the module 4 did not rotate easily, as in the first scenario, then if handle 2 and the supporting shaft were pushed to the forward and counter-clockwise direction, then since module 4 in this case does not rotate freely, then translational motion will be input, and

undesirably so, into the top translational module 5 which will be detected by the linear pick-up and sent to the "manipulator". Either way, with the Dzholdasbekov module 4 rotating easily or not so easily, the off-center placement of the support shaft for the handle on the rotary module 4 renders the controller inherently inaccurate and subject to either sending unwanted signal to the "manipulator" or to requiring two hands to operate, i.e., one hand on the handle 2, and the other hand grasping translational modules or rotary module 4 to prevent the unwanted movement and signals which would otherwise be caused during certain manipulations of the controller handle. The Dzholdasbekov handle 2 does not rotate in axis 23, it orbits or "swings" about the axis 23, and this is an entirely different arrangement than the present claimed design.

The use of a separate handle or thumbwheel 25 in Dzholdasbekov for one of the degrees of rotational freedom is an entirely different structural arrangement than that of the present claimed invention. Thus, the Dzholdasbekov device is significantly structurally different than the claimed invention, thereby rendering a 35 U.S.C. 102 rejection of the present claims in view of Dzholdasbekov inappropriate. Likewise, Dzholdasbekov does not anticipate structuring a single handle to be resolvable about three mutually perpendicular axes intersecting one another within the handle, said three mutually perpendicular axes being the three "sensed" or detected axes, thus Dzholdasbekov does not anticipate the structure of the present claims, and thus a 35 U.S.C. 103 obvious rejection of the present claims in view of Dzholdasbekov alone would be inappropriate. Dzholdasbekov does not provide a "single handle" through which all of six bi-directional degrees of hand input are applied to the 6-DOF controller, and for this reason, in the least, the claims should not be rejection over Dzholdasbekov under 35 U.S.C. 102 or 103.

Claims 26-30, 32-35, 37-40 are patentable over Dzholdasbekov because Dzholdasbekov neither uses or anticipates the use of 12



separate and distinct sensors as claimed. Dzholdasbekov does not suggest the many benefits to be gained by the use of 12 separate and distinct sensors in a 6-DOF controller. The very narrow claims of 30-31, 33-35, 38-40 all describe structuring not shown or anticipated by Dzholdasbekov or any other prior art reference for that matter, and thus these claims should be found allowable. It should be noted Dzholdasbekov does not use or anticipate a single 6-DOF handle, twelve orthogonal mechanical outputs, twelve separate sensors, tactile feedback means, and spatial isolation means in a 6-DOF controller.

It should be noted that the Dzholdasbekov disclosure clearly teaches that "this is the way to build a 6-DOF controller", not indicating to those skilled in the art that the Dzholdasbekov structuring for achieving the three degrees of rotational freedom has significant shortcomings as described above, and thus Dzholdasbekov provides no reason or incentive for those skilled in the art to change the handle rotational arrangement along the lines as is presently claimed. This teaching away in Dzholdasbekov from using a single handle rotatable about a single point within the handle defined by the intersection of three mutually perpendicular axes, and sensing the rotations of the single handle about the three axes is a significant teaching away from the present claimed structural combination of claims 23 and 32, and teaches away from suggesting that a handle such as in King or Menahem should be applied to the sliding plate structure of Dzholdasbekov or Frank et al for that matter. Thus a combination of the teachings of Dzholdasbekov in view of King, Frank et al and Menahem would not render claims 23 and 32 obvious under 35 U.S.C. 103.

Claims 23-35 are patentable over King because King does not utilize or anticipate anything similar to the sliding-plate-linear-conversion means of the present claims, (in the least). There is simply no support for the Examiner's contention that



King includes something similar to a sliding-plate-linear-conversion means, and thus claims 23-35 should not be rejected under 35 U.S.C. 102 in view of King, because King clearly does not describe the claimed structural combination per 35 U.S.C 102. Something similar to Applicant's sliding-plate-linear-conversion means is shown in the Frank et al patent and in the Dzholdasbekov disclosure, but is clearly not used or anticipated by King, and so claims 23-35 are not described in King or rendered obvious by King alone because King does not use or anticipate sliding-plate-linear-conversion means, in the least, and does not anticipate the claimed structural combination and the benefits to be gained thereby. The Examiner's comments directed toward trying to show that King includes something similar to sliding-plate-linear-conversion means has been noted, but pivotally connected and restrained, and rotatably moving members, clearly moving in arcing rotations by no means constitutes "sliding-plate-linear-conversion means" which is limited to only linear movement and that linear movement is only within a horizontal plane with no vertical movement allowed. In contrast, the King member -48- cannot move or slide horizontally, as it is secured at stationary block -46- with pivot point -110- so that member -48- cannot move or slide horizontally, but can only move vertically pivoting about pivot point -110- in an arch or radius. This structuring in King is entirely different and completely unrelated to Applicant's "sliding-plate-linear-conversion means".

It should be noted at this time that King, like Dzholdasbekov, Frank et al, Kley, Menahem and IBM, and/or any of the other prior art of record for that matter, does not use or anticipate 12 sensors to sense the 12 orthogonal movements of bi-directional six degrees of freedom; does not anticipate and cannot use (by its structuring) tactile feedback vibration means, and spatial isolation means on 12 sensors with tactile feedback means in a 6-DOF controller.

Claims 23-36 are patentable over King alone because, from another view point, horizontal linear input force against the King spherical handle causes King's handle to move in an arc, as is discussed repeatedly and in detail in the King disclosure, no matter how perfectly straight and horizontal the input force against the handle. This causes the King device to be confusing and non-intuitive as the handle arcs (orbital rotation) with pure linear horizontal input against the handle. This arcing in the King handle is due to the lack of anything similar to "sliding-plate-linear-conversion means". King does not suggest any structure or structural combination to solve this problem in the King controller, as King clearly states to those skilled in the art that there is no problem with this arching of the handle, and thereby not giving any reason for those skilled in the art to modify the King device along the lines of that which is presently claimed in claims 23 and 32. Please see King column 4 lines 1-17, and 55-62, and column 5 lines 32-34, and figure 1, 2 and 4. King states clearly that the arcing of the King handle is not a problem, and thus needs, by strong implication in the very least, no changes to solve this problem, and thus King teaches away from suggesting to those skilled in the art that sliding-plate-linear-conversion means such as is shown in Dzholdasbekov and also in Frank et al should be applied to a shaft supported handle rotatable about a single point in three rotational degrees of freedom in a 6-DOF controller. This clear teaching away from that of claims 23 and 32 in King renders a rejection of these claims under 35 U.S.C. 103 over King alone, or King in view of Dzholdasbekov, and further in view Frank et al and Menahem inappropriate.

Menahem describes a handle which rotations about a center point in three degrees of rotation, but does not teach or suggest a 6-DOF controller having sliding-plate-linear-conversion means.

Frank et al (henceforth Frank) describes sliding-plate-linear-conversion means absent a rotating handle.

Claims 37-40 is patentable over King because King does not use or anticipate the use and benefits of 12 independent sensors as presently claimed. King does not suggest the many benefits to be gained by the use of 12 separate and distinct sensors as claimed. Thus King does not describe the claimed structure of these claims per 35 U.S.C 102, and King does not anticipate the structuring and the benefits per 35 U.S.C 103, thus these claims are allowable over King alone, and are also allowable over any and all combinations of references of the prior art of record.

Dzholdasbekov alone is structured significantly different than that which is claimed in all of the claims 23-40, and thus a 35 U.S.C. 102 rejection of any of these claims over Dzholdasbekov alone would be inappropriate.

Dzholdasbekov alone is structured significantly different than that which is claimed in all of the claims 23-40, and Dzholdasbekov alone does not anticipate or suggest that which is claimed in claims 23-40, and thus a 35 U.S.C. 103 rejection of any of these claims over Dzholdasbekov alone would be inappropriate. If the Examiner sees a suggestion in Dzholdasbekov suggesting the structural combination of any of the present claims, would the Examiner please indicate precisely which lines in Dzholdasbekov suggests the present claimed structures.

King alone is structured significantly different than that which is claimed in all of the claims 23-40, and thus a 35 U.S.C. 102 rejection of any of these claims over King alone would be inappropriate.

King alone is structured significantly different than that which is claimed in all of the claims 23-40, and King alone does not anticipate or suggest that which is claimed in claims 23-40, and

thus a 35 U.S.C. 103 rejection of any of these claims over King alone would be inappropriate. If the Examiner sees a suggestion in King suggesting the structural combination of any of the present claims, would the Examiner please indicate precisely which lines in King suggests the present claimed structures.

There is no suggestion in the combination of King and Dzholdasbekov that a 6-DOF controller would be improved by utilizing sliding-plate-linear-conversion means supporting a shaft-supported single handle, the single handle being rotatable about a single point within said handle, the point being defined by the intersection of three mutually perpendicular axes, and rotation of the single handle about these three axes being sensed by sensors. Further, there is no suggestion in the combination of King and Dzholdasbekov that a 6-DOF controller would be improved by utilizing a separate and distinct sensor for each direction of each of the bi-directional 6 degrees of freedom, and that further improvements could be made by applying tactile feedback means to such 6-DOF controller, and that even further improvements and advantages could be made to such a 6-DOF controller by the application of spatial isolation means all in combination as is called for in some of the present narrower dependant claims. The addition of IBM to the combination of King and Dzholdasbekov still does not suggest this very advantageous combination as recited in many of the narrower present dependant claims. This use of 12 separate and distinct sensors in a 6-DOF controller provides many benefits, and opens the door so to speak to the application of several other substantially advantageous and non-anticipated novel means in such a 6-DOF controller.

There is no suggestion in the combination of King and Dzholdasbekov that a 6-DOF controller would be improved by utilizing sliding-plate-linear-conversion means supporting a shaft-supported handle, the handle being rotatable about a single point within said handle, the point being defined by the

intersection of three mutually perpendicular axes; and further, that this 6-DOF controller would be improved by utilizing a separate and distinct sensor for each direction of each of the bi-directional 6 degrees of freedom, and even further as in the present claims 30, 33, that such a 6-DOF controller would be even further improved by the application of tactile feedback means, and even further as in the claims 31, 35 with spatial isolation means applied in association with each of the sensors. In other words, there is no way that King alone, Dzholdasbekov alone, or King in view of Dzholdasbekov describes or suggests the invention of claims 23-40, and particularly many of the present narrow dependant claims such as 25-31, 33-35, and 38-40, as the benefits provided by the structuring of the present claims as detailed in the present specification.

The inventive structural combination recited in claim 23, is essentially the combination of sliding-plate-linear-conversion means within a stationary base, supporting a shaft-supported single handle, the single handle being rotatable in three degrees of rotational freedom about a single point within said handle, the point being defined by the intersection of three mutually perpendicular axes; with three linear degrees of freedom also being provided, wherein all of the six degrees of freedom input may be applied into the controller through said single handle. This novel structure provides MAJOR significant useful improvements and benefits in a 6-DOF controller. To combine these features as in claim 23 to obtain the clear and numerous benefits of such a combination in a 6-DOF controller is not suggested by King alone, Dzholdasbekov alone, by a combination of King in view of Dzholdasbekov, or by any reasonable combination of the related prior art of record.

An advantage of the structural combination of features of claim 23 is the inclusion of mechanically translating full 6-DOF into twelve orthogonal mechanical outputs of the controller which



leads to the further advantage of ease in applying a separate sensor to each of the twelve outputs; the advantage of ease in applying spatial sensor isolation means to each of the sensors, which in turn provides the advantage of forgiveness for human hand inaccuracies in all 6 degrees for freedom and which also further allows the advantage of being able to use substantial vibration as tactile feedback without falsely triggering sensors. Another advantage of mechanically translating full 6-DOF into twelve orthogonal mechanical outputs as in claim 23 is that it allows for a much wider range of sensor types to be utilized, including very inexpensive open/close contact switches, or many other types of more sophisticated sensors.

The invention of claim 23 achieves far more than a combination which any or all of the prior art references suggest, expressly or by any reasonable implication.

The Examiner's attention is respectfully called to the decision of In re Sernaker of the Court of Appeals for the Federal Circuit, at 217 USPQ 1, 5, 6 (Fed. Cir. 1983):

We may assume, for purposes of this decision, that all the prior art references in this case are sufficiently related to one another and to a related and common art, that the hypothetical person skilled in the art must be presumed to be familiar with all of them. That being so, the next questions are (a) whether a combination of the teachings of all or any of the references would have suggested (expressly or by implication) the possibility of achieving further improvements by combining such teachings along the line of the invention in suit, and (b) whether the claimed invention achieved more than a combination which any or all of the prior art

references suggested, expressly or by reasonable implication.

If the Examiner believes that such a structure as recited in claim 23 is suggested, or the benefits thereof are suggested within any of the prior art alone or in combination, would the Examiner please quote the lines which would suggest or lead one skilled in the art to want to make such a combination in order to achieve such benefits list above.

The Court of Appeals for the Federal Circuit has reiterated the proscription of the Patent and Trademark Office aggregating references in the absence of a teaching or suggestion supporting the combination. The Court of Appeals for the Federal Circuit has specifically required that teachings of references are properly combined only if there is some suggestion or incentive in the prior art to do so. Thus, as brought out more specifically in *ACS Hospital Systems v. Montefiore Hospital*, 221 USPQ 929,933:

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under Section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. The prior art of record fails to provide any such suggestion or incentive. Accordingly, we hold that the court below erred as a matter of law in concluding that the claimed invention would have been obvious to one of ordinary skill in the art under section 103.

Again, if the Examiner believes that such a structure as recited in claim 23 is suggested, or the benefits thereof are suggested within any of the prior art alone or in combination, would the Examiner please quote the lines which would suggest or lead one skilled in the art to want to make such a combination in order to achieve such benefits list above.

The inventive structure of claim 23 is not suggested in a combination of King in view of Dzhholdabekov, and further in view of Menahem, Frank et al and Kley.

If the Examiner believes that such a structure as recited in claim 23 is suggested, or the benefits thereof are suggested within the combination of King in view of Dzhholdabekov, and further in view of Menahem, Frank et al, Kley, and Colston, would the Examiner please direct Applicant to the particular lines within these disclosures which would direct one skilled in the art to want to make such a combination, and further wherein the suggestion is in such detail that one skilled in the art would not have to utilize inventive skill to structurally combine the structural features as claimed in the present claim 23.

Again, Applicant does not believe that the mere existence of features located scattered throughout the prior art references constitutes, by the mere existence of such scattered features, any suggestion to make combinations of the features. Applicant believes there must exist within the prior art references, and relatively clearly so, suggestions of significant benefits to be gained by making a combination of such features. The benefits gained by the combination of features in claim 23 are not within the references of the combination of King in view of Dzhholdabekov, and further in view of Menahem, Frank et al, Kley, and Colston to support a 35 U.S.C. 103 obviousness rejection, and thus allowance of claim 23 and the claims dependant thereupon is solicited.

The combination of features of claim 32, and thus the claims 33-35 dependant thereon, is not described by any single prior art reference of record, and is not suggested by any reasonable combination of prior art references of record, and thus allowance of claims 32-35 is solicited, as claim 32 provides an almost equal number of unanticipated advantages as described above for claim 23.

The combination of features of claim 36 is not described by any single prior art reference of record, and is not suggested by any reasonable combination of prior art references of record, and thus allowance of claim 36 is solicited.

The combination of features of claim 37, and thus the claims 38-40 dependant thereon, is not described by any single prior art reference of record, and is not suggested by any reasonable combination of prior art references of record, and thus allowance of claims 37-40 is solicited.

From the above, it should now be clearly appreciated that the combination of King in view of Dzholdasbekov, and further in view of Menahem, and Frank et al, or Dzholdasbekov in view of King, and further in view of Menahem and Frank et al, does not suggest to those skilled in the art that which is presently claimed in claims 23 and 32(in the least), as the combination of the teachings of these two primary references is away from the structural combination as claimed in claims 23, 32, not toward such a structural combination.

Additionally, the Examiner is respectfully requested to view and examine the narrower dependant claims as if they are independent claims. Although Applicant strongly believes that each of the independent claims 23, 32, 36, 37 recites clearly novel structural combinations thus escaping any possible 35 U.S.C

102 and 103 rejection based on the prior art of record, the narrower dependant claims when treated properly by the Examiner, may be when appropriate, objected to but otherwise allowable should the independent claim on which any of the dependant claims depend, whether directly or indirectly be rejected. Such treatment of dependant claims is believed to be the normal practice at the PTO, and there has in past been no clear indication of the Examiner treating Applicant's dependant claims as such, and thus again, the Examiner is requested to treat the dependant claims properly, as some of them, such as claims 26-30, 33-35, 39-40 for example, are quite narrow and specific, and are very clearly not suggested or anticipate by any reasonable combination of the prior art of record.

The Examiner has in the past clearly been picking and choosing from a number of prior art references in an effort to aggregate different elements in an attempt to simulate Applicant's claimed structure. It is improper to do such picking and choosing unless there is some suggestion within the references themselves that they be so aggregated. The Court of Appeals for the Federal Circuit and the Patent Office's own Board of Appeals have clearly indicated that such an aggregation of references is improper.

The Examiner's attention is respectfully called to the decision of *In re Sernaker* of the Court of Appeals for the Federal Circuit, at 217 USPQ 1, 5, 6 (Fed. Cir. 1983):

We may assume, for purposes of this decision, that all the prior art references in this case are sufficiently related to one another and to a related and common art, that the hypothetical person skilled in the art must be presumed to be familiar with all of them. That being so, the next questions are (a) whether a combination of the teachings of all or any of the references would have



suggested (expressly or by implication) the possibility of achieving further improvements by combining such teachings along the line of the invention in suit, and (b) whether the claimed invention achieved more than a combination which any or all of the prior art references suggested, expressly or by reasonable implication.

\* \* \*

Certainly the board pointed to no prior art that separately suggested expressly or by implication a three-element combination made up in this way.

..... Without some express or implied suggestion, we cannot assume that one of ordinary skill in the art would have found it obvious to mate the transfer print with this pattern...The lesson of this case appears to be that prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantages to be derived from combining their teachings.

Applicant's claimed invention of claims 23-40 clearly achieves far more than a combination which any or all of the prior art references suggest, expressly or by reasonable implication. Again, claims 23-40 clearly achieve far more than a combination which any or all of the prior art references suggest, expressly or by reasonable implication. For but one example, Applicant's structural combination clearly achieves "more than a combination which any or all of the prior art references suggested", as recited in claim 36 which provides novel structuring in a 6 degree of freedom controller affording the potential of pure and full separation of control along and about

any of the three mutually perpendicular axes, wherein "pure rotation" may be achieved absent any linear movement, and "pure linear movement" may be achieved absent any rotation.

The Court of Appeals for the Federal Circuit has reiterated the proscription of the Patent and Trademark Office aggregating references in the absence of a teaching or suggestion supporting the combination. The Court of Appeals for the Federal Circuit has specifically required that teachings of references are properly combined only if there is some suggestion or incentive in the prior art to do so. Thus, as brought out more specifically in *ACS Hospital Systems v. Montefiore Hospital*, 221 USPQ 929,933:

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under Section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. The prior art of record fails to provide any such suggestion or incentive. Accordingly, we hold that the court below erred as a matter of law in concluding that the claimed invention would have been obvious to one of ordinary skill in the art under section 103.

The Court of Appeals for the Federal Circuit considered the question of aggregation of references in connection with a court appeal in *Panduit Corporation v. Dennison Manufacturing Co.*, 227 U.S.P.Q. 337, and reiterated the requirement that the prior art must provide either a teaching or a suggestion of the claimed invention in order to provide a proper basis for rejection of claims under 35 U.S.C. 103 by the Patent Office.

"In the present case, for example, there

is no way that one skilled in the art in 1961 and 1968 (necessarily unaided by knowledge of the patents in suit and Caveney's testimony) would find in the prior art either a teaching or a suggestion of the claimed inventions."

There is no "teaching or suggestion of the claimed inventions" in the prior art of King, Dzholdasbekov, Frank, Kley and IBM or any reasonable combination of any of the prior art of record.

The Court of Appeals for the Federal Circuit, in the Panduit Corp. case, has specifically required that, in resolving the question of nonobviousness, the Examiner must consider each and all of the references in their entirety, including if the references teach away from the claimed invention in determining whether there is any suggestion therein of the combination claimed.

" Three fundamental errors resulted from a disregard of the decisional parameters governing the proper evaluation of prior art. The first, as above indicated, was the picking and choosing of 'teeth,' 'ledges,' 'hinges,' either absent from the prior art references or there disclosed in entirely distinct form, characteristics, and relationships. It must be remembered that the Examiner is required to consider references in their entireties, i.e., including those portions that would argue against obviousness.

The Examiner has clearly neglected to consider the portions of the references which argue against obviousness and teach away from the present invention. In the prior art, particularly the primary references of King and Dzholdasbekov, the Examiner must consider each of the references in their entirety, including if

the references teach away from the claimed invention in determining whether there is any suggestion therein of the combination claimed. Clearly both King and Dzholdasbekov alone and combined teach away from Applicant's invention rather than suggesting Applicant's inventive combined structure, and by failing to acknowledge such of King's teachings against the combination, the Examiner is failing to follow the clear mandates of the Court of Appeals for the Federal Circuit.

The Patent Office policy is clearly to follow these mandates. Thus, in the decision of the Patent and Trademark Office Board of Patent Appeals and Interferences, Ex parte Clapp, 227 USPQ 972, that Honorable Board specifically followed the mandate by requiring that either the references must expressly or impliedly suggest the claimed combination, or the Examiner must present a convincing line of reasoning as to why an artisan (routinier) would have found the claimed combination to have been obvious in light of the teachings of the references. In the present case, the Examiner repeatedly states that features shown in the reference suggest particular intricate combinations along the lines of Applicant's invention, and applicant simply does not see such suggestion in these references.

The Patent Office Board of Appeals more particularly concurred with the Court of Appeals for the Federal Circuit that it is improper for an Examiner to selectively pick and choose elements or concepts from various references to arrive at a claimed invention by using hindsight gained from his knowledge of Applicant's claims as a guide. Thus, where, as in the present case, the Examiner cites references respectively showing different elements but barren of any teaching or suggestion in the references that they be combined in the manner of the claims, such aggregation of references does not properly support a rejection of the claims.

The Board of Appeals further specifically negated the use of simplicity and hindsight as criteria for resolving the issue of obviousness under Sec. 103. It is respectfully submitted that,

in the present case, the Examiner is going directly contrary to the Board's clear edict in this regard and is aggregating references without any basis for such aggregation found or suggested therein, and utilizing hindsight gained from his knowledge of applicant's invention as the sole basis for such aggregation, and, thus it is respectfully submitted that the claims are clearly allowable over the most stringent requirements of 35 USC 103.

It is respectfully requested that all claims 23-40 be held allowable over the prior art of record.

#### SECONDARY CONSIDERATIONS

The Examiner is requested to consider the following as it is believed very relevant because of the number of high dollar offers to acquire rights to Applicant's invention, particularly that which is claimed in claims 23, 32, 36 and 37. The offers exceed one million U.S. dollars and are from very large and well known companies that have employees who are without question skilled in this art. Applicant's invention is perceived as being very novel, advancing the art significantly, and of substantial commercial value by those skilled in the art as will be herein shown.

Since the inception of Court of Appeals for the Federal Circuit in 1982, the court has clearly increased the evidentiary importance of secondary considerations of nonobviousness. Clearly commercial success, long felt need, failure of others, etc., must be taken into account when the question of obviousness verses nonobviousness exists. The CAFC has completely abandoned the much earlier Supreme Court's view that such evidence is useful merely to tip the balance in close cases; in many Federal Circuit cases, secondary considerations are more determinative of nonobviousness than is prior art.

The Examiner's attention is directed to the Federal Circuit



case of *Alco Standard Corp. v. Tennessee*, 808 F.2d 1490 (Fed. Cir. 1986), cert. dismissed, 483 U.S. 1052 (1987), where the patent at issue was for an apparatus and method of testing turbine rotors in electrical generators for flaws or cracks. The district court had held the patent nonobvious, supporting its prior art examination with evidence of commercial success, long-felt need, and failure of others. The Federal Circuit admitted that the prior art indicated that the patent was obvious, nonetheless, it affirmed the holding of validity, reasoning that the strong evidence of secondary considerations was sufficient to outweigh the prior art determination. Thus, under the section 103 analysis, the Federal Circuit actually views secondary considerations as more dispositive than the prior art determination, at least when the secondary considerations constitute especially persuasive evidence of nonobviousness.

The Examiner's attention is additionally directed to the Federal Circuit case of *In W.L. Gore & Associates v. Garlock, Inc.*, (721 F.2d. 1540 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984), where the court stated:

"The objective evidence of nonobvious, i.e., the "indicia" of Graham (Supreme Court "Graham v. John Deere")... may in a given case be entitled to more weight or less, depending on its nature and its relationship to the merits of the invention. It may be the most pertinent, probative, and revealing evidence available to aid in reaching a conclusion on the obvious/nonobvious issue. It should when present always be considered as an integral part of the analysis."

The Federal Circuit has repeated these views in many subsequent cases, emphasizing that secondary considerations, if present, are always relevant under section 103, and must always be given evidentiary weight before reaching a decision on the obvious/nonobvious issue. In several cases the Federal Circuit has vacated or reversed district court holdings of invalidity for

obviousness because the trial court failed to consider evidence of secondary considerations. *Simmons Fastener Corp. v. Illinois Tool Works, Inc.* is illustrative. (739 F.2d 1573 (Fed. Cir. 1984), cert. denied, 471 U.S. 1065 (1985). In the district court, Simmons brought a declaratory judgment action asking the court to declare a patent for a screw anchor used to fasten shelves to the inside of a refrigerator invalid. The parties stipulated that the invention had achieved substantial commercial success. In reaching its holding of obviousness, however, the district court did not consider this evidence, reasoning that the Graham prior art analysis produced a clear showing of obviousness. The Federal Circuit agreed that the prior art may have indicated a conclusion of obviousness, but it nevertheless reversed the district court, concluding that the strong evidence of commercial success established nonobviousness despite the prior art analysis.

The above in no way constitutes an admission by Applicant that the prior art of record indicates in any way that the claimed invention is obvious, but rather this addressing of the secondary considerations will just further support the fact that the claimed invention is non-obvious, and that the claims should all be held allowable.

The foregoing discussion of secondary considerations such as commercial success is particularly relevant in this case since there have been a number of high dollar offers to acquire rights to Applicant's invention each exceeding one million U.S. dollars and from very large and well known companies that have employees who are without question skilled in this art. Those skilled in this art judged Applicant's invention substantially as is currently claimed as being very novel, advancing the art significantly, and of substantial commercial value.

The Examiner's attention is directed toward exhibit A which is a NONDISCLOSURE AGREEMENT sign between Applicant and Logitech,

a California company who has very large world wide sale of computer controller.

The Examiner's attention is now directed toward exhibit B which is a three page letter to Applicant and Applicant's business associate "Steve". This three page letter is an offer by Logitech to purchase rights to Applicant's invention. Please read if carefully and note the "Scenario One" and "Scenario Two" offers.

The two offers were never, as of yet, accepted by Applicant, and during negotiations with Logitech, Logitech apparently misunderstood and believed rights had been or would be acquired to Applicant's invention, and took it upon themselves to build and sell Applicant's invention substantially as claimed. This product is called "Cyberman". A flyer on "Cyberman" was submitted in Applicant's response of 06/03/94. Well over 70,000 units of "Cyberman" were sold in a very brief period of time for approximately \$100.00 per unit street price. Applicant requested Logitech to no longer make and sell Applicant's invention, and they complied with Applicant's wishes. Applicant received a royalty check for \$40,000.00 shown in exhibit C.

Applicant is contractually bound against disclosing any further details pertaining to the "Cyberman" product.

Clearly Logitech, and Logitech's counsel being Townsend and Townsend, a major intellectual properties law firm comprised of hundreds of patent lawyers, believed Applicant's invention was novel, advanced the art significantly, and was or is of substantial commercial value. The consumers who purchased the Cyberman thought the product was of value.

The Examiner's attention is now directed toward the letter marked exhibit D, which is directed to my business associate

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Steve Bowman from Key Tronic. This letter is an offer to acquire rights to Applicant's invention, with the anticipation of Applicant receiving multi-millions of dollars annually for his invention rights. Please read this letter and consider it carefully. This is after review of the pending patent application, after review by those skilled in the art at Key Tronic, and professional review by the intellectual property law firm of Wells, St. John of Spokane Washington.

Clearly, professional opinion was and/ or is that the present invention is of substantial commercial value.

Due to a lack of a timely first office action on the present application, Applicant was unable to come to a full agreement with Key Tronic.

It is hereby requested the application and claims being reexamined in view of this response, and that all claims be found allowable. Thank you.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, 1.56(a).

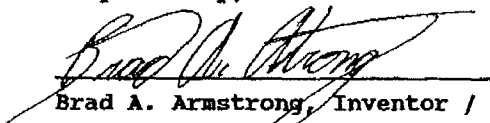
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may

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jeopardize the validity of the application or any patent issued thereon.

Respectfully;



Date: January 10, 1996

Brad A. Armstrong, Inventor / Applicant

Applicant's current phone number is (916) 342-5342

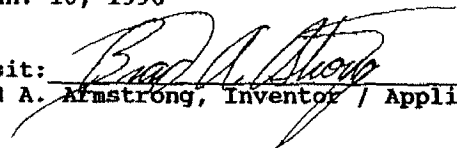
CERTIFICATE OF EXPRESS MAILING

Commissioner of Patents and Trademarks  
Washington, D. C. 20231

I hereby certify that this complete response to the outstanding Office Action of 08/10/95 is being deposited with the United States Postal Service as EXPRESS MAIL, article number EG313952649US with sufficient postage paid in an envelope addressed to: Commissioner of Patents and Trademarks, Washington,

D. C. 20231, on this date: Jan. 10, 1996

Signature of one making deposit:



Brad A. Armstrong, Inventor / Applicant