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(56) Documents Cited:
GB 2107157 A
JP 110045152 A
DE 003709442 A1
US 20070188453 A1

(58) Field of Search:
INT CL **G06F**
Other: **WPI, EPODOC**

(54) Abstract Title: **Flywheels giving inertial effects for a computer mouse ball**

(57) The invention relates to the addition of a flywheel to each orthogonal cylinder driven by the ball of a mechanical computer mouse or to other mechanical sprite-driving mechanism. By way of the flywheels, the transfer of energy between linear and angular kinetic energy may be used to give the computer mouse a feel of mass or inertia. Cogs may connect the cylinders to the flywheels, and effects may be fine-tuned with an electric motor.

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MASSIVE MOUSE

Everyone who uses a computer is familiar with a computer mouse. There are a number of different technologies behind the design of computer mice but they are all aimed at transmitting to the computer information pertaining to the position and motion of the mouse (as well as the states of the buttons and wheel). The information pertaining to mouse position and movement is generally used to establish the position and movement of a cursor or 'sprite' on the user's computer screen. No information is communicated back to the user via the mouse itself. A computer mouse has no direct feedback mechanism.

In reality, moving an object around requires a force, and by Newton's laws there would be an equal and opposite force exerted by the object on the mover. This is not the case in virtual space where a sprite is essentially massless. It has no mechanical inertia and therefore may be moved without a material force and without an inertial response.

The invention outlined here relates to a modification of the traditional computer mouse. The modification may be understood by way of a comparison with a child's mechanical toy car. Most children's toys of 50 years ago had no built-in electronics, yet some still had significant elements of virtual reality. I had a working model steam engine, for example. One common device was a flywheel attached via cogs to the wheels of a toy car. Appropriate cogs allowed one to force the flywheel into rapid motion by dragging the car's wheels smartly along the floor. Releasing the car when the flywheel was in motion enabled the car to travel considerable distances not otherwise possible without this inertial force behind it. Essentially it made the car appear to be quite massive in response to the starting force as well as in response to the frictional stopping forces.

Imagine a mechanical computer mouse is built like such a child's mechanical car. The ball inside the mouse drives two orthogonal cylinders. Imagine these cylinders were connected via cogs to two separate flywheels. Pushing this mouse along a table-top would take some effort to get it moving. It would then continue to move by itself by extracting energy from the flywheels, until eventually it would come to rest due to frictional forces or due to user intervention.

The effect of this is to make the sprite feel massive. Moving it would require noticeable effort and stopping it would also demand noticeable effort from the hand gripping the mouse. This would give the sprite an element of tangible reality not otherwise present.

Further control using electric motors and gears to alter properties and states of the flywheels could be added to effect fine-tuning of specific effects such as gravitational attraction, resistance from barriers and feedback from collisions as seen on screen.

CLAIM

By attaching, through cogs or otherwise, relatively massive flywheels to the cylinders on each axis of a mouse's driving motion mechanism, it is possible to give an impression of inertial mass to objects on screen, making it possible to convey plausible tangible virtual reality feedback to a computer user directly via the mouse.

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Application No: GB0704717.8 **Examiner:** Terence Newhouse

Claims searched: - **Date of search:** 29 April 2008

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	-	JP11045152 A MELCO, see also WPI Abstract Accession No. 1999-200494 [17] and fig 2 noting mouse ball cylinders 60a,60b driving flywheel 76
A	-	US2007/188453 A1 LOGITECH, see e.g. paragraph 0046 noting inertial effects of flywheel on scroll wheel
A	-	DE3709442 A1 ALPS ELECTRIC, see also WPI Abstract Accession No. 1987-279076 [40] and figs noting inertial effect of flywheel 20 on input wheel 6
A	-	GB2107157 A SONY, see paragraph bridging pages 1 & 2 noting inertial effect of flywheel 45 on dial 42

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

G06F

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
G06F	0003/033	01/01/2006