ORTHOGONAL 3D WHEEL

We are told not to reinvent the wheel, but if you can think of a better wheel than the usual disk (or short fat cylinder) then why not?

This invention relates to a new shaped wheel. Conceptually, it's a bit like a 50p piece which, although not circular, still has a constant diameter and therefore acts like a circular coin in slot machines. This ‘wheel’ is not a flat disk and yet it rolls smoothly along a plane with constant energy and momentum.

The shape of the wheel is a bit like a big curved crisp from a packet of crisps except that it rolls smoothly even though it is clearly not flat or round.

Imagine two large circular disks that are connected by an axle along the line of both diameters so that it looks a bit like a figure eight (8), or the sign for infinity (∞). Now take the two disks, one in each hand and twist the axle that is secured along the line joining the diameters of both disks. Twist until the plane of one disk is at right angles to the plane of the other.

Now take the orthogonal ‘wheel’ and roll it. You will find that it rolls fairly well - better than one might expect. The axle rocks up and down while the circular fins seem to churn sideways along the ground. The central point moves in a spiral.

The central point in the system moves from side to side and up and down. This is because circular fins are not the ideal shape. The best shape would be that which allowed the contraption to roll without changing the height of the central pivot and without making it to move from side to side as the contraption rolls forward.

The ideal shape may be calculated using 3D geometry. It is found that there is a unique solution to the problem up to 2 free parameters. These free parameters are the height of the pivot point from the floor and the length of the fin (or wing) from the pivot point to the tip.

The mathematical derivation is not given here. It is found that there is a plane curve which if given symmetrically to each of the four edges that touch the ground will result in a system that rolls smoothly along a plane in a fixed direction. If used as a wheel on a vehicle it would be particularly useful in rough terrain as it smoothes out bumps and linear tracks which a standard wheel would find problematic and would actually accentuate over time.

CLAIM

1. A novel design of a wheel that is neither flat nor circular, but essentially 3D and is specially shaped such that the pivotal point in the centre of the arrangement moves in an exact straight line at a constant height when the system is rolled along the ground.

ABSTRACT

THE SQUARE WHEEL

The invention relates to a pair of specially shaped fins fitted in a line along their axes (the x axis) but with one fin being oriented in the x-y plane and the other being oriented in the x-z plane. The fins are specially shaped such that the pivot point in the centre between the two fins moves in a straight line when the system is rolled along the ground. Together, the two orthogonal fins constitute a wheel which is very stable laterally and which does not demand such flat surfaces as the traditional wheel in order to roll satisfactorily.