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Walking Cycle

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Abstract
The mechanism used in this walking cycle is versatile of its kind in which ,the cycling pedals are replaced with a treadmill belt .This treadmill belt drives the cycle forward by introducing free wheels and shafts mechanism.The prototype design requires an treadmill belt, shafts, the frame of treadmill, the free wheels, gears, chaindrive and gearchain .The platform on which the treadmill belt is placed is fabricated. All the links are made up of normal MS (mild steel) including the head which has a direct contact with the treadmill belt. The system is expected to move as heavy weights up to 150 KGs approximately. The aim of the project work is to design and fabricate a walking cum cycle mechanism that makes much easier to move people from one place(section) to the other even while processing in the factories, industries, etc.

INTRODUCTION
The walking cycle has a simple mechanism, operated with free wheels,gear chain,bearing shaft and links arrangement. As by the linear walking motion is converted into rotary motion which indeed done by the gear chain and free wheel mechanism of the linkages, which takes very simple movement. The rotary motion is again converted in to linear motion of the cycle through mechanical linkages(gearchain and free wheels) arrangement.

The conveyor system is either continuous movement or intermittent which is completely based on the person. So a basic free wheel mechanism with bearings is designed with time delay which can be used to halt the movement when necessary.

This invention relates to improvements in transport devices, and it relates particularly to devices for transferring people, with small in number in case of a bike or a cycle .The Walking Bicycle is the one, which combines walking and cycling into one activity.

The Walking Bicycle combines the two activities into a linear motion, allowing you to propel yourself forward at desired speed, simply by walking on the belt provided. Usually, the operation of the walking cycle machine is controlled by the user itself by simply walking on the treadmill belt and also balancing the cycle. The operating speed of the walking cycle differs on the amount of force applied by the user.

Components used in walking cycle

- Cycle
- Treadmill
- Bearings
- Chain and sprockets
- Free wheels
- Shafts

Operations performed

- Arc welding and cutting
- Brazing
- Lathe operation (turning, threading, knurling)

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Cycle

A bicycle, often called a bike or cycle, is a human-powered, pedal-driven, single-track vehicle, having two wheels attached to a frame, one behind the other.Two-wheeled bicycles come in a range of designs.

Some resemble traditional two-wheeled bikes with frame modifications to accommodate a wider axle and additional rear wheel. Others are recumbent, supporting the rider in a chair-type seat, with a frame that is low to the ground2-wheeled cycles is known for their stability and ease of riding.

They are the principal means of transportation in many regions. They also provide a popular form of recreation, and have been adapted for use as children's toys, general fitness, military and police applications, courier services, and bicycle racing.

A treadmill is a device generally for walking or running while staying in the same place. Treadmills were introduced before the development of powered machines, to harness the power of animals or humans to do work, often a type of mill that was operated by a person or animal treading steps of a tread wheel to grind grain.

Advantages

- Enable the user to set up an exercise regime that can be adhered to irrespective of the weather.
- Incline setting can allow for consistent "uphill" training that is not possible when relying on natural features.
- Rate settings force a consistent pace.
- Some treadmills have programmers such that the user can simulate terrains, e.g. rolling hills, to provide accurate, programmed, exercise periods.

Disadvantages

- Some treadmill runners develop bad running habits that become apparent when they return to outdoor running. In particular a short, upright, bouncy gait may result from having no wind resistance and trying to avoid kicking the motor covering with the front of the foot.
- Imposes a strict pace on runners, giving an unnatural feel to running which can cause a runner to lose balance.
- Treadmill running is not specific to any sport, i.e., there is no competitive sport that actually utilizes treadmill running. For example, a competitive runner would be far better off running outdoors through space since it is more specific and realistic to his event.

As an indoor activity

- Many users find treadmills monotonous and lose interest after a period.
- Treadmills do not offer the psychological satisfaction some runners get from running in new locations away from the distractions of home.

As a machine

- May cause personal injury if not used properly. Of particular concern are children who reach into the treadmill belt while it is running and suffer severe friction burns that may require multiple skin grafts and result in lasting disability.Injury to children can be avoided by removing the safety key when the treadmill is not in use, without which, the treadmill belt will not start.
- Costs of purchase, electrical costs, and possible repair are significantly greater than those of running outside.
- Takes up space in homes.

OMNI DIRECTIONAL TREADMILL

Advanced applications are so called omnidirectional treadmills. They are designed to move in two dimensions and are intended as the base for a "holodeck". There are several solutions which were proposed and research continues because some issues remain unsolved, such as large size, noise and vibration. There are parallel developments being conducted by researchers working on projects

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sponsored by the Department of Veterans Affairs to create virtual reality environments for a wheelchair trainer in order to promote therapeutic exercise.

Chains

A chain is a series of connected links which are typically made of metal. A chain may consist of two or more links.

- Those designed for lifting, such as when used with a hoist; for pulling; or for securing, such as with a bicycle lock, have links that are torus shaped, which make the chain flexible in two dimensions (The fixed third dimension being a chain's length.)
- Those designed for transferring power in machines have links designed to mesh with the teeth of the sprockets of the machine, and are flexible in only one dimension. They are known as roller chains, though there are also non-roller chains such as block chain.

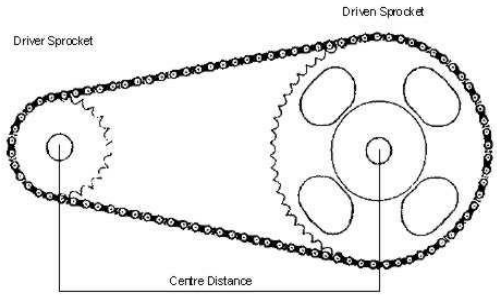

Fig 1: Chain

Shafts

A shaft is a rotating machine element which is used to transmit power from one place to another. The power is delivered to the shaft by some tangential force and the resultant torque (or twisting moment) set up within the shaft permits the power to be transferred to various machines linked up to the shaft. In order to transfer the power from one shaft to another, the various members such as pulleys, gears etc., are mounted on it. These members along with the forces exerted upon them causes the shaft to bending. In other words, we may say that a shaft is used for the transmission of torque and bending moment. The various members are mounted on the shaft by means of keys or splines.

Bearings

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Many bearings also *facilitate* the desired motion as much as possible, such as by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

Motions

Common motions permitted by bearings are:

- axial rotation e.g. shaft rotation
- linear motion e.g. drawer
- spherical rotation e.g. ball and socket joint
- hinge motion e.g. door, elbow, knee

Roller Bearings

A rolling-element bearing, also known as a rolling bearing, is a bearing which carries a load by placing rolling elements (such as balls or rollers) between two bearing rings called races. The relative motion of the races causes the rolling elements toroll with very little rolling resistance and with little sliding

Free wheel

In mechanical or automotive engineering, a freewheel or overrunning clutch is a device in a transmission that disengages the driveshaft from the driven shaft when the driven shaft rotates faster than the driveshaft. An overdrive is sometimes mistakenly called a freewheel,but isotherwise unrelated.

The condition of a driven shaft spinning faster than its driveshaft exists in most bicycles when the rider holds his or her feet still , no longer pushing the pedals . In afixed , without a freewheel, the rear wheel would drive the pedals around.
Mechanics of free wheel

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Arc welding

Arc welding is a type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point. They can use either direct (DC) or alternating (AC) current, and consumable or non-consumable electrodes. The welding region is usually protected by some type of shielding gas, vapour, or slag. Arc welding processes may be manual, semi-automatic, or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the Second World War. Today it remains an important process for the fabrication of steel structures and vehicles.

TYPES OF ARC WELDING

- Consumable electrode method
- Non-consumable electrode method

Consumable electrode methods

One of the most common types of arc welding is shielded metal arc welding(SMAW), which is also known as manual metal arc welding (MMAW) or stick welding. An electric current is used to strike an arc between the base material and a consumable electrode rod or *stick*. The electrode rod is made of a material that is compatible with the base material being welded and is covered with a flux that gives off vapours that serve as a shielding gas and provide a layer of slag, both of which protect the weld area from atmospheric contamination. The electrode core itself acts as filler material, making separate filler unnecessary.

Gas metal arc welding (GMAW), commonly called *MIG* (for *metal/inert-gas*), is a semi-automatic or automatic welding process with a continuously fed consumable wire acting as both electrode and filler metal, along with an inert or semi-inert shielding gas flowed around the wire to protect the weld site from contamination. Constant voltage, direct current power source is most commonly used with GMAW, but constant current alternating current are used as well.

Flux-cored arc welding(FCAW) is a variation of the GMAW technique. FCAW wire is actually a fine metal tube filled with powdered flux materials. An externally supplied shielding gas is sometimes used, but often the flux itself is relied upon to generate the necessary protection from the atmosphere. The process is widely used in construction because of its high welding speed and portability.

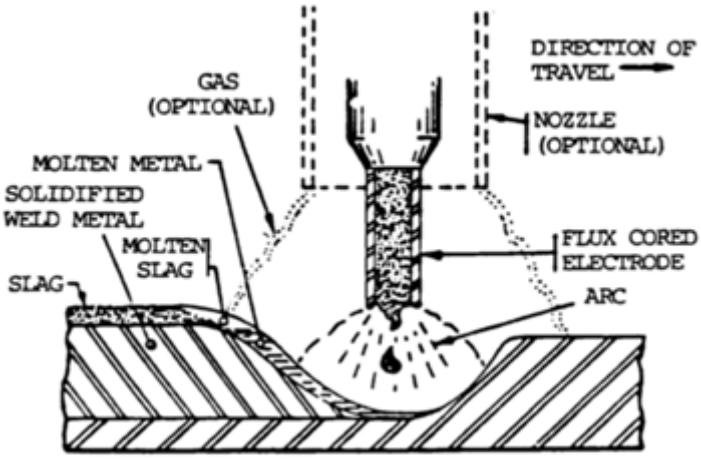

Fig 2: flux cored arc welding

Submerged arc welding(SAW) is a high-productivity welding process in which the arc is struck beneath a covering layer of granular flux. This increases arc quality, since contaminants in the atmosphere are blocked by the flux. The slag that forms on the weld generally comes off by itself and, combined with the use of a continuous wire feed, the weld deposition rate is high. Working conditions are much improved over other arc welding processes since the flux hides the arc and no smoke is produced.

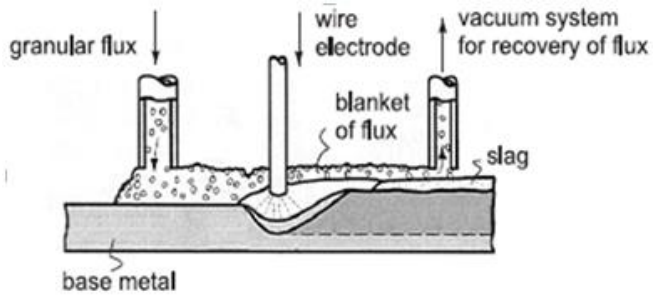

Fig 3: Submerged arc welding

Non-consumable electrode methods

Brazing

Brazing is a metal-joining process in which two or more metal items are joined together by melting and

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flowing a filler metal into the joint, the filler metal having a lower melting point than the adjoining metal.

Flux

Unless brazing operations are contained within an inert or reducing atmosphere environment (i.e. a vacuum furnace), a flux such as borax is required to prevent oxides from forming while the metal is heated. The flux also serves the purpose of cleaning any contamination left on the brazing surfaces. Flux can be applied in any number of forms including flux paste, liquid, powder or pre-made brazing pastes that combine flux with filler metal powder. Flux can also be applied using brazing rods with a coating of flux, or a flux core.

Lathe machine

Lathe is a machine that helps in shaping several material pieces in the desired shapes. A lathe is a machine that rotates the piece on the axis in order to perform various operations like cutting, facing, knurling, deformation and more.

Metal spinning, thermal spraying, woodturning and metalworking are the common operations performed with a lathe machine. One can even shape pottery with this working wonder. Whatever material used in lathe machine whether metal or wood is molded first. The most commonly used lathes are the woodworking lathes.

Lathes Operations

The general operations done with the lathe are grooving, turning, cutting, sanding and etc. if anyone wants to operate the lathe machine then he must first know about the feeds, cutting speed, depth of the cut and usage of tool should be considered. Each lathe operation has got its own factors that need to be considered before doing the work.

The factors should be used properly so that one can avoid from mishandling and mishaps while performing any kind of lathe operation. With every cut desired the speed, depth and feed of the lathe machine is changed for precision.

Types of Lathe Operation

The working of the lathe machine changes with every operation and cut desired. There are a lot of operations used for using the lathe machine. Some of the common lathe operations are:

Facing

This is usually the first step of any lathe operation on the lathe machine. The metal is cut from the end to make it fit in the right angle of the axis and remove the marks.

Tapering

Tapering is to cut the metal to nearly a cone shape with the help of the compound slide. This is something in between the parallel turning and facing off. If one is willing to change the angle then they can adjust the compound slide as they like.

Parallel Turning

This operation is adopted in order to cut the metal parallel to the axis. Parallel turning is done to decrease the diameter of the metal.

Parting

The part is removed so that it faces the ends. For this the parting tool is involved in slowly to make perform the operation. For to make the cut deeper the parting tool is pulled out and transferred to the side for the cut and to prevent the tool from breaking

Lathe Cutting Tools

There are several lathe cutting tools that help in cutting with the lathe machine. The commonly used tools are mentioned below:

- Carbide tip tools
- Grooving tool
- Cut-Off blade
- Parting blades
- Boring bar
- Side tool

Design of the cycle

This can be constructed by the simple arrangements of the gears, belt and frame on a normal bicycle. The cycle is to be divided into three parts. The first part

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consists of the front wheel and handle, the second part consists of the seat,pedals, gear & gear chain .The third part consists of rear wheel.Now coming to the design of walking cycle, the second part (seat,gear,gear chain &pedals)is to be replaced with a belt drive similar to that of a treadmill and the rear roller of this belt is to be welded with a gear.

CONCULSION

By this project we are creating a platform in which mechanical energy is converted into linear motion. By using our simple walking nature we are changing it to a good running speed bywhich we are not only saving energy but also recreating a formula of using small investmentto a big amount of achievement. This prototype can be a good promoted area to use the energy being wasted on threadmills in fitness centers. By using this prototype we can not only save energy but also create anew idea of energy distribution in electrical field which is a common need to everyone infuture.

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