ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 2, Issue 2, February 2016

Smart Extender

Roshan Varghese Rajan[1], Antony Selva Ravi[2], Nihad Najeem[3], Emil Mathew[2], Nithin Jacob[3]
UG student, Mechanical Department, PSN College of Engineering & Technology, Tirunelveli, India [1,2,3,4,5]
roshanmelel@gmail.com

***Abstract*—A Smart Extender is a mechanical device which facilitates the double recoiling of thread possible by using a single traditional clock spring. It actually increases the efficiency of traditional recoiling system by 200%. The current scenario only promotes the one side or comparatively single length of thread for recoil by using a clock spring. The thread is wounded on the central rod and when pulled out makes energy, which is made store in a spring for using it for the recoiling. We introduce an extra set of thread wounding in the same central rod, but is pulled out through the opposite direction thereby using the technology to full extend. Traditionally when the length is restricted according to the strength of the clock spring used, in the smart and innovative design of the Smart Extender double length recoiling of thread is made possible by using the same clock spring. This makes the system more effective with low cost and less storage place. The needs and comfort of people have to be continuously satisfied by using engineering as a tool for crafting the necessary devices. The Smart Extender is one such device which ensures the increased comfort rate and satisfies the necessaries up to the maximum. This facilitates the double length recoiling of thread by using the same traditional clock spring**

***Index Terms*—Spring, Thread, Central Rod, Recoiling**

I. INTRODUCTION

A Smart Extender is a mechanical device which facilitates the double recoiling of thread possible by using a single traditional clock spring. It actually increases the efficiency of traditional recoiling system by 200%.

In the traditional system we could observe that only one spring with one long thread is present, which produces the recoiling of thread possible. The current scenario only promotes the one side or comparatively single length of thread for recoil by using a clock spring.

The spring is an energy storing device, which stores energy needed to recoil when compression occurs or when load is applied. There are various types of springs available in the market to suit the needs of customers in various sectors of application.

The thread is wounded on the central rod and when pulled out makes energy, which is made store in a spring for using it for the recoiling.

We introduce an extra set of thread wounding in the same central rod, but is pulled out through the opposite direction thereby using the technology to full extend. This would help in utilizing the system to the maximal level as possible. Thus the efficiency of the new innovative design is sure to be double when compared to the traditional recoiling system.

Traditionally when the length is restricted according to the strength of the clock spring used, in the smart and innovative design of the Smart Extender double length recoiling of thread is made possible by using the same clock spring. That is double length recoiling is made possible by using a single clock spring. This makes the system more effective with low cost and less storage place.

The needs and comfort of people have to be continuously satisfied by using engineering as a tool for crafting the necessary devices. Human beings always try to remain in the idle position, by reducing the muscular work with more safety. So the engineers are always aiming for introducing device or systems that reduces the human labor and increase the comfort and safety of product.

The need of a Recoiling Extender is to collect and arrange the wires safe and proper, in a little space available. It also ensures that no damage is made to the wire when kept inside the case. When the wire or thread is made distributed loose in the floor, there is a chance of distribution that could occur due to moving people, or machines.

The Smart Extender is one such device which ensures the increased comfort rate and satisfies the necessaries up to the maximum. By the introduction of a Smart Extender it is made sure that no loose wire is distributed freely around the floor without proper guidance. This facilitates the double length recoiling of thread by using the same traditional clock spring arrangement.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 2, Issue 2, February 2016

STUDY OF SUBJECT

SPRINGS

Springs are elastic bodies (generally metal) that can be twisted, pulled, or stretched by some force. It could be also considered as an energy storing device. Which stores energy upon loading and release upon unloading. They can return to their original shape when the force is released. In other words it is also termed as a resilient member.

Based on the shape behavior obtained by some applied force, springs are classified into the following many ways. The basic knowledge about spring is necessary to know about the actual system design of Smart Extender

Helical Springs are made of wire coiled in the form of helix. The cross section of a helical spring may be circular, square or rectangular. A helical spring is normally classified into two types namely the Open coil springs (or) Compression helical springs and closed coil springs (or) Tension helical springs

A helical tension spring has some means of transferring the load from the support to the body by means of some arrangement. It stretches apart to create load. It is notable that the gap between the successive coils is small.

The wire is coiled in a sequence that the turn is at right angles to the axis of the spring and spring is loaded along the axis. By applying load the spring elongates in action as it mainly depends upon the end hooks. The application of helical tension spring includes garage door assemblies, vise-grip pliers, and carburetors.

In a helical compression springs the gap between the successive coils is larger. It is made of round wire and wrapped in cylindrical shape with a constant pitch between the coils. By applying the load the spring contracts and in unloading the spring comes back to its mean position.

There are mainly four forms of compression springs which are namely, Plain end, Plain and ground end, Squared end, Squared and ground end. Among the four types, the plain end type is less expensive to manufacture. It tends to bow sideways when applying a compressive load. The application of helical compression springs includes Ball point pens, Pogo sticks and Valve assemblies in engines.

Torsion Spring is a form of helical spring, but it rotates about an axis to create load. It releases the load in an arc around the axis which creates torsion in the body. A torsion spring is mainly used for torque transmission in various devices. The ends of the spring are attached to other application objects, so that if the object rotates around the center of the spring, it tends to push the spring to retrieve its normal position. The applications of Torsion Springs include Mouse tracks, Rocker switches, Door hinges, Clipboards etc.

A Spiral Spring of a band of steel wrapped around itself a number of times. It is also known as a clock spring. This is the typical type of spring that is used in the Smart Extender. The recoiling of thread is made possible in the Smart Extender.

Its inner end is attached to an arbor and outer end is attached to a retaining drum. It has a few rotations and also contains a thicker band of steel. It stores power when winded and releases power when it unwinds. The application of a spiral spring include Alarm timepiece, Watch and Automotive seat recliners

A Leaf spring is a simple form of spring commonly used in the suspension vehicles. A leaf spring is also called as a semi-elliptical spring; as it takes the form of a slender arc shaped length of spring steel of rectangular cross section. The center of the arc provides the location for the axle, while the tie holes are provided at either end for attaching to the vehicle body.

Heavy vehicles, leaves are stacked one upon the other to ensure rigidity and strength. It provides dampness and springing function. It can be attached directly to the frame at the both ends or attached directly to one end, usually at the front, with the other end attached through a shackle, a short swinging arm.

The shackle takes up the tendency of the leaf spring to elongate when it gets compressed and by which the spring becomes softer. Thus depending upon the load bearing capacity of the vehicle the leaf spring is designed with graduated and un-graduated leaves.

Because of the difference in the leaf length, different stress will be there at each leaf. To compensate the stress level, pre-stressing is to be done. Pre-stressing is achieved by bending the leaves to different radius of curvature before they are assembled with the center clip. The radius of curvature decreases with shorter leaves.

The extra initial gap found between the extra full length leaf and graduated length leaf is called as nip. Such pre-stressing achieved by a difference in the radius of curvature is known as nipping. The application of leaf springs is mainly in automobiles suspension systems.

Various advantages are also there in using a leaf spring in vehicle. A leaf spring can carry lateral loads at the level maximum compared to other springs. It provides sufficient braking torque in vehicles. It takes up normal driving torque and withstands the shocks provided by the vehicles when it is in motion.

Thus the basic property of the spring i.e. stores energy upon loading and release upon unloading, is utilized in the working of Smart Extender to make it an effective device.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 2, Issue 2, February 2016

PROPOSED METHODOLOGY

PRINCIPLE USED

Using a single clock spring, double length recoiling of thread is made possible. The treads are wounded around the central rod on either sides of the clock spring. An equal displacement is made by pulling out the thread simultaneously in opposite directions. Thus we use the same clock spring for the double length recoiling.

PARTS OF SMART EXTENTER

The smart extender is a mechanical arrangement which is made to facilitate the double length recoiling possible by using the same clock spring. The main parts of a Smart Extender are:

01 Central Rod
02 Thread
03 Clock Spring
04 End Nail
05 Extender Cover

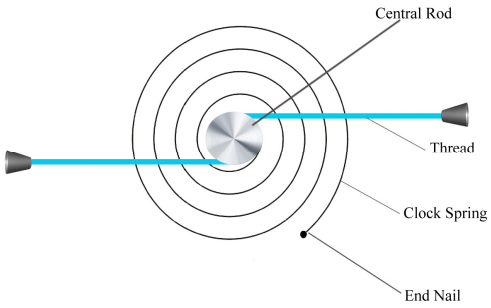

FIG 01

Central Rod

A central rod is the major component which facilitates the wounding of thread in either sides of it. The Clock Spring is also place in the center of the central rod. When the thread is pulled out an equal displacement is made in central rod, generating energy in the clock spring. Thus central rod is the common factor which co-links all other parts together.

Thread

Long threads are wounded in either side of the central rod which is pulled out when an extension is needed and recoiled back when not in need. The thread could be replaced by wires, coils or chains and re-coiling could be done easily.

Clock Spring

The clock spring is the one which facilitates the recoiling of thread possible. The springs are those systems which store energy when loaded and releases when unloaded, or vice-versa. When the thread is pulled out the clock spring inside get compressed and stores the energy produced. When there is no load or pulling of threads then the energy stored made utilized for recoiling purpose.

End Nail

One end of the spring is attached to an end nail which helps in the compression of the clock spring made possible. Thus the End Nail is a main part of the Smart Extender.

Extender Cover

The whole of the mechanical arrangement is covered by an external cover, which helps in the protection of the system. It also provides the uninterrupted working of the smart extender by avoiding external contact.

WORKING PROCEDURE

The arrangement used in the Smart Extender facilitates the double length recoiling possible by using the same clock spring. There exist two stages in the working of a Smart Extender. They are:

Initial Stage : Spring is in relaxed position
Final Stage : Spring is in Energized position

Initial Stage - Spring is in relaxed position.

In the initial stage the spring is in relaxed condition that is the thread is not pulled out. The clock spring will not store energy at this stage. The central rod also remains in its mean position.

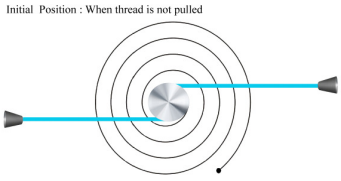

FIG 02

Final Stage - Spring is in Energized position.

In the final stage the spring is in compressed condition. This occurs when the thread is made pulled out. The clock spring will store energy for the recoiling of thread at this stage. The treads are wounded around the central rod on either sides of the clock spring. An equal displacement is made by pulling out the thread simultaneously in opposite directions. And the clock spring facilitates the double length recoiling possible.

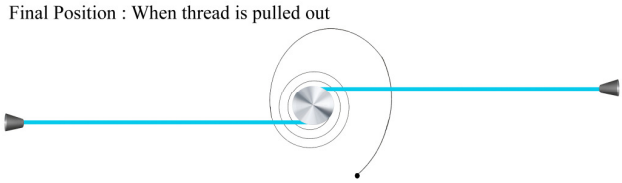

FIG 03

In release of force or load the thread recoils itself and comes back to the initial stage. Now the spring is in relaxed condition, and the thread is not pulled out. The clock spring will not store energy at this instant.

In addition we could install a stopper to control the length and recoiling of thread. Avoiding this stopper will make no change in the basic mechanical operation.

ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE)
Vol. 2, Issue 2, February 2016

CONCLUSION

A Smart Extender is a mechanical device which facilitates the double recoiling of thread possible by using a single traditional clock spring. It is a special mechanical arrangement that have various applications in the day to day life.

REFERENCES

[1] White, Lynn Jr. (1966). Medieval Technology and Social Change. New York: Oxford Univ. Press. ISBN 0-19-500266-0., p.126-127
[2] Usher, Abbot Payson (1988). A History of Mechanical Inventions. Courier Dover. ISBN 0-486-25593-X., p.305
[3] Dohrn-van Rossum, Gerhard (1997). History of the Hour: Clocks and Modern Temporal Orders. Univ. of Chicago Press. ISBN 0-226-15510-2., p.121

Authors Profile

Roshan Varghese Rajan (First Author) is pursuing his Bachelor of Engineering degree in Mechanical Engineering from PSN College of Engineering and Technology, Tirunelveli, India. His aim is to involve in Research and to become an Inventor. His areas of interest are Engineering Mechanics, Kinematics and Dynamics.