

INSTRUCTOR:

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INTRODUCTION:

This project is a part of course ME371(hands on lab).It's aim is to analyse one mechanical gadget where we have chosen a bicycle lock.Nowadays there are a large variety of locks available,but this webpage describes only about a specific type that is commonly used in India.It is placed across the rim of the bicycle.A lock is said to be n lever lock if it has n number of levers.



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HISTORY OF LOCK

The earlier known lock is the wooden Egyptian lock, in use four thousand years ago. Specimens have been found in the pyramids and this type of locks is depicted in ancient sculptures. Another prevalent type of lock found in China and other parts of world is a Padlock, which works on the spring barb principle.

The first lock made of metal which attempted to provide security by requiring a key of peculiar configuration were the warded locks first made by Romans and common in Europe by 13th century. Lock making then became a skilled trade and extraordinary range of ward design were produced.

The security provided by modern locks began in 18th century when lever lock was invented. Basically, lever is a latch which fits into a slot on the bolt, the key lifts the latch. In 1778, ROBERT BARRON invented the double-action lever in which two levers (now more than two) must be raised each to exactly the right heights to clear its slot. This was the great modern advance in lock security and multiple lever is still the basis of most locks made today.

Nowadays most common lock is the YALE LOCK, a cylindrical pin tumbler design which combines the best features of many locks, including ancient Egyptian wooden one. It was invented in 1848 by LINUS YALE, an American from CONNECTICUT and improved by his son.

The bicycle lock became common in 20th century after the invention of bicycle.

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DISCRIPTIONS OF PARTS:

1. OUTER BODY:

Outer body of the lock is made of thin iron sheet. As being the outer body, shape of the lock is governed by its structure. It is round in shape and has got two halves to put the other parts inside. These two halves are joined through rivets. The upper part has a hole for guideway of key. Grooves are cut in the slotted part of the keyhole. It also has a circular groove in which a circular rod slides.



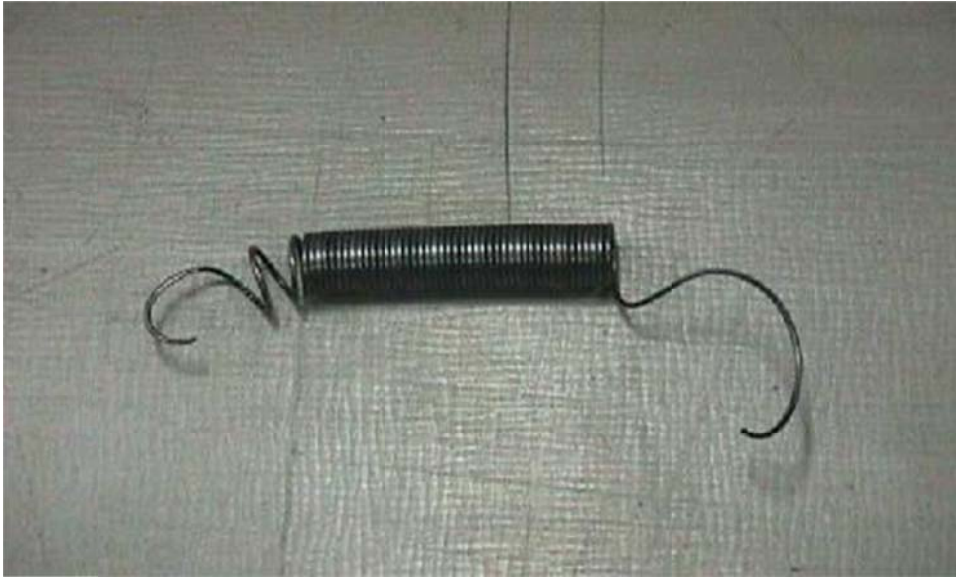
2.CIRCULAR ROD:

This rod is circular in cross section and is itself semicircular. Movement of this rod through spokes(outside the lock) makes the locking and unlocking. A small flat handle is attached to it to help the user for locking or unlocking. Another end of it inside the lock has a groove made to restrict or permit the to-and-fro motion of the rod. A small hole is provided at this end to attach the extension spring.



3.EXTENTION SPRING:

It is a helical spring. It makes the return motion of the circular rod automatic while unlocking. It also prevents locking of the rod by itself under gravitational or other minor disturbances, preventing damage to the spokes. One end of it is attached to the main rod and another one to the main body of the lock.



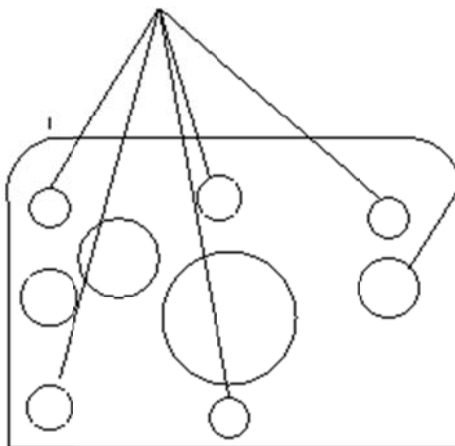
4.BASE PLATE:

The main functioning parts of the lock like levers, key-guideway etc. are mounted in between two base plates which are joined finally through rivets. It also has a hole for attachment of lock release button to it.



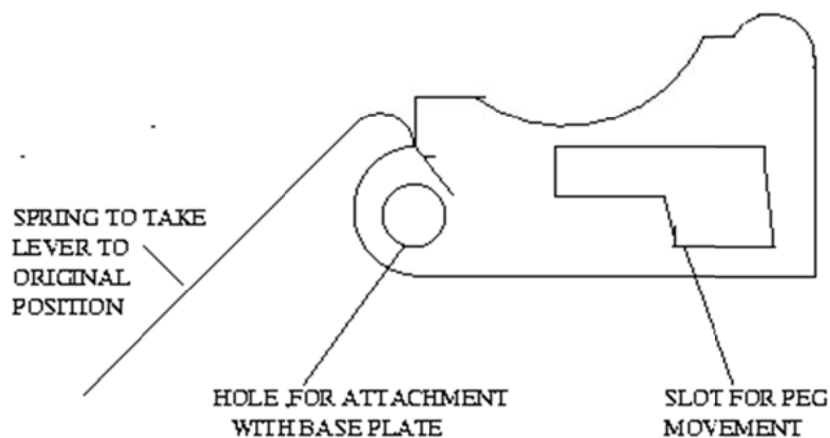
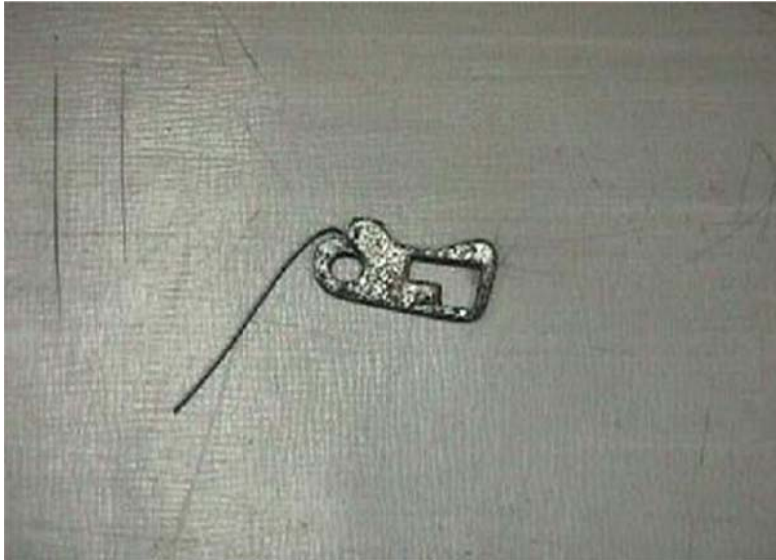
HOLE FOR RIVETS

HOLE FOR ATTACHMENT
OF LOCK RELEASE BUTTON



5.LEVERS:

A lever is pivoted plate which is slotted to allow a pin on the peg to pass through. One end of the lever carries a member which acts like a spring, which prevents the lever to move of its own. As levers are slotted in different positions, the key requires steps of different lengths to lift the lever properly. This gives a specific shape to the key providing more security.



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OVERALL FUNCTIONING OF LOCK:

Starting from the unlocked position, to lock, the handle provided on the main rod is pushed downwards due to which the groove on it comes upward and it fits with the one end of the lock release button. When the key is rotated and taken out, the peg moves down and prevents the button from rotating. Thus the cycle gets locked.

When key is inserted and rotated, it rotates the levers so that the slots in all the levers come in alignment. Then it rotates the peg which goes up due to which pin of the peg moves upward within the slot. So, when the lock release button is pressed, its other end moves up and releases the circular rod which moves to the unlocked position under the action of tension force of the extension spring, making the lock unlocked.



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MATERIALS USED:

The outer body is made of "tin". Springs are made of spring steel, while the remaining parts are made of mild steel.

DRAWBACKS AND MODIFICATIONS:

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1. Using thin iron sheet as the material for the outer body gives somewhat lesser safety. So, some stronger materials like mild steel etc. can be used.
 2. Key holes should have more peculiar shape like more grooves cut in the slotted parts so that it itself rejects the wrong key.
 3. The number of levers should be increased because, more the number of levers, more is the security.
 4. The circular rod should be made of more harder material so that it could not be cut easily.

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