INTRODUCTION TO THIS COURSE

Mechanical engineering is not a course which one can read in room and apply to real problems of life.To be a good mechanical enginner,one should have good knowledge of practical devices.One can gain this practical knowledge only when he opens and study some mechanical devices.

This course is design to give first hands-on experience of mechanical devices(e.g. sewing machine,I.C.engine,cycle).It consist of two parts.In one part we open and study these gadgets and reassemble. second part of course is consist of study of a mechanical or electro-mechanical device and to make representation of it.

BACK 

PROJECT-REPORT

We have chosen stapler as our project for representation.
Stapling, developed originally in 19th century for paper attachment in office has become a highly specialised industry. As well as being indispensible for everyday office work,modern stapling serves as a varities of industries,display and exhibition work,cart and bag closing in the packaging field and binding by securing papers at their center fold.

HISTORY

The history of stapler is a long and seasoned one .The earliest stapling machine we know of is made ofwas built during the 1970s for king Louis15 of france . In the late 1980's stapler,masde of cast iron,using individual staples were introduced . The word stapler dates from 1909. beforre that time they were called fastener or something else.

For the next 20 years , stapler remained the same . In the late 1930's Swilinging revolutionised stapling with open channel stapler or"4 second loading ". This was when the top of the stapler would open up and we drop a ful strip of staples in, which also the basic model of the commonly used stapler , one that we are going to present here.

This consist of following parts--->

1. BODY

   The part of the stapler that hold all the other parts of consisted in the basic structure.It is connected to the base by the rear pin-joint.

2. BASE WITH ANVIL

   Base is a flat metal plate with a builtin anvil.A notch is cut on one side of the base and the other side remains flat . It gives rise to both sides of the return spring to come into contact with it at different point of operation. A smooth curved groove is made at the anvil which curls the staples without buckling it.

3. STAPLE`S MAGAZINE

   Staples are U shaped pieces of wire supplied in the form of a continuous channel or strip of metal which has transverse lines of weakness impressed along its length to define the individual staples.

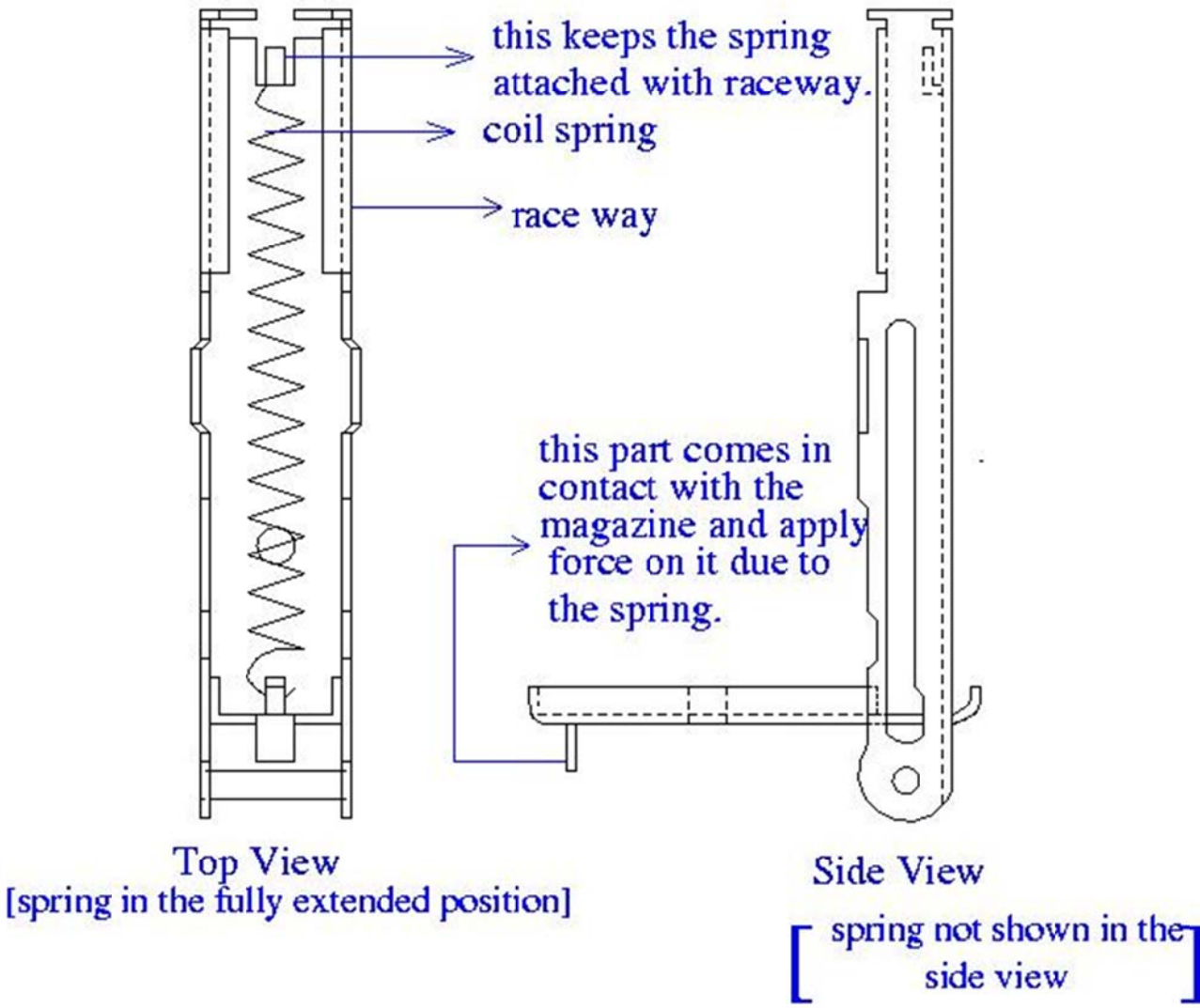
4. LEAF SPRING

   It is made of spring steel.It has two functions,one end of it acts as blade and other end works as a two arm leaf spring.

5. HELICAL/COIL SPRING

   It is made of an material having high strength because this spring is stretched more than its normal length.

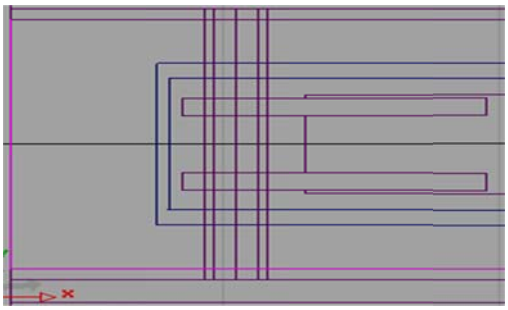
6. RACEWAY



Magzine of staples is placed in raceway

7. REAR PIN-JOINT

This is formed of a metal(mild steel),it just join different part of stapler by pin joint method.The hinge allows for all opening of the stapler. Each piece of the stapler can swing around the hinge.



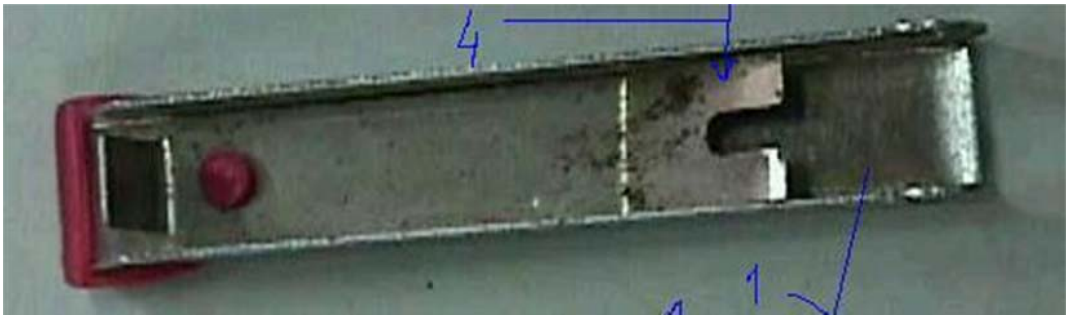
Top view of hinge

8. BLADE

Blade in the stapler breaks off the staples from strip as it drives them into the materials to be joined.

9. STAPLE EXIT

The hole at the front of the magazine that staples exit from.



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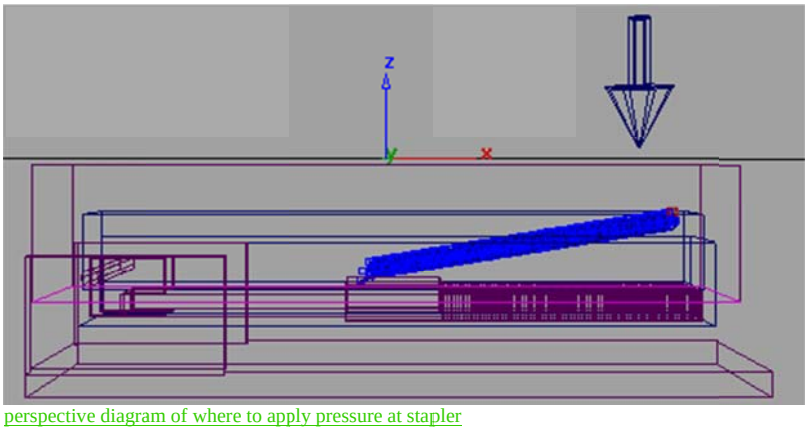
MATERIAL AND MACHINING OF STAPLER

All the parts of the stapler are made of spring steel.The machining **i**sd done by die and pressing method.Where ever we need we use punching to remove material.They are all chrome-nickel plated to avoid rusting and also provide smoothness to all parts two spring are made of two different steel materials.

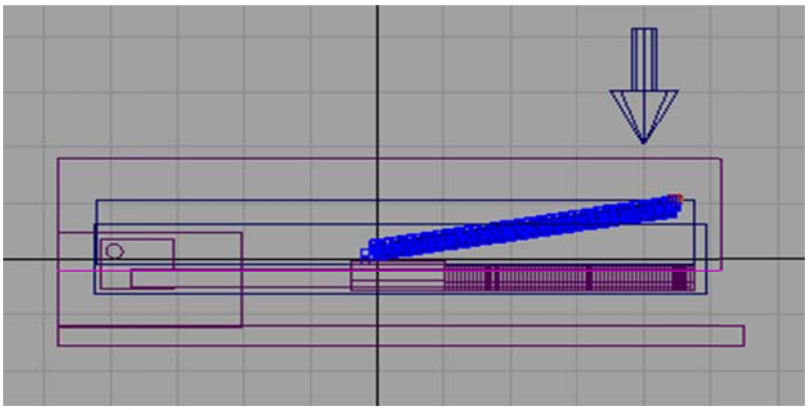
MECHANISM

In all type of stapling the mechanism is same.We apply pressure to the top near the front with the items that are to be stapled in the jaws of the stapler.When we press down, pressure is applied to the crown or top of the first staple in the row

by a bottomless box like form called the blade within the stapler.Staples are automatically fed into position beneath the blade from the spring loaded raceway,and the driving force is applied by hand.With the everyday office stapler,including stapler pliers which works on the lever-fulcrum principle,the paper to be attached together are placed between the stapler head and anvil with shaped grooves accurately aligned beneath it.The staples legs,set at right angles to the crown,pierce the papers and then,coming into contact with the anvil becomes compressed into a flat rectangular shape.The top piece of staplern stay on the top of the paper. A sliding piece attached to a spring pushes the staple forward so that as long as there staples in the stapler one will be up front to be compressed.



perspective diagram of where to apply pressure at stapler


Side diagram of where to apply pressure to stapler

The return spring spring has remarkable feature.Its end is divided with a short cut in between.One side is little bent forward while the other end is straight,it gives rise to gradually increasing spring back action during operation since the different part of the return spring gradually comes under the pressure of ....Finally,the return spring pushes the bash plate and magzine apart after use with maximum spring back action.


BACK

BEAUTY OF DESIGN

1. base consists of marked lines on its inner surface. These lines make it convenient to staple different paper at suitable positions .
2. component staple-magazine has two small parallel perturbations on its end . This makes itsmovement smooth and limits its angle of inclination with respect to the raceway.
3. Coil spring is connected to the end of staple-magazine in such a way as to provide torque when it is in its inclined position. Point of connection is offset to the corner of staple-magazine.
4. The raceway consists of two lengthwise cuttings on both of its vertical walls . the cutting becomes widler in size towards the end . This facilitates greater angular inclination with respect to the base.The raceway , on the top of its vertical walls, has bents that keep staple-magazine in contact with the body and doesn't allow it to fall over the base after the punch.
5. The base has a small triangular projection on its end that can take out the stapled pin if needed.

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SUGGESTION FOR IMPROVEMENTS

1. **This type of stapler is little big in size and it can not be carried comfortably .So it can be modified into a papersheet type device which we can carry in our pocket or purse.**

2. **Staples are made of mild steel ,a fairly ductile material having low toughness which causes them to bend sometimes while being stapled into a band of paper. so the material used should be improved in terms of toughness value keeping its other properties same.**

3. **The area of the staple pin that experiences bending forces is very small which result in high stress value .this can be avoided by simply increasing the upper area of the pins.**

4. **The locking arrangement is done by simply punching two points in the raceway and thus raising material at two points which wears very soon and hence this locking device fails very soon which can be improved by avoiding this type of locking system.We can use two different leaf springs.One between raceway and bash,other one between body and a plate used to give proper support during stapling.**

5. **We can use a guideway to support staples when they are in raceway.**
6. **We can use compresion spring in place of extension spring for this we will have to give a support to avoid buckling.**

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