

# HOW THINGS WORK

## THE CYCLE BELL

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**COURSE: ME371**

**INSTRUCTORS**

**Dr. AMITABHA MUKERJEE**

**Dr. M.K.MUJU**

**PROJECT PARTNERS:**

R.BHASKARAN(97259)

SACHIN KUMAR(97285)

NITIN GUPTA(97230)

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### ● **INTRODUCTION AND AIM**

In the last two centuries engineering saw rapid development. Today the world is full of engineering products and it seems impossible to live without them. This exercise, which is a part of the ME371 course aims at giving a feel of this progress in engineering.

In this mini-project we attempt to study the working, assembly and manufacturing of a simple mechanical gadget-a Cycle Bell, by completely disassembling it.

### ● **COMPONENTS AND WORKING OF THE CYCLE BELL**

Click here to see a note on the working of the bicycle bell.

### ● **SOME SUGGESTIONS FOR IMPROVEMENT**

Click here to see some improvements in the bicycle bell.

### ● **HISTORY AND DEVELOPMENT OF BELL**

Click here to see a note on the history and development of bell making and its traditional usage.

## ● [CREATIVE BELL DESIGN](#)

Click here to see some really beautiful images of bicycle bells

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# COMPONENTS AND WORKING OF BELL

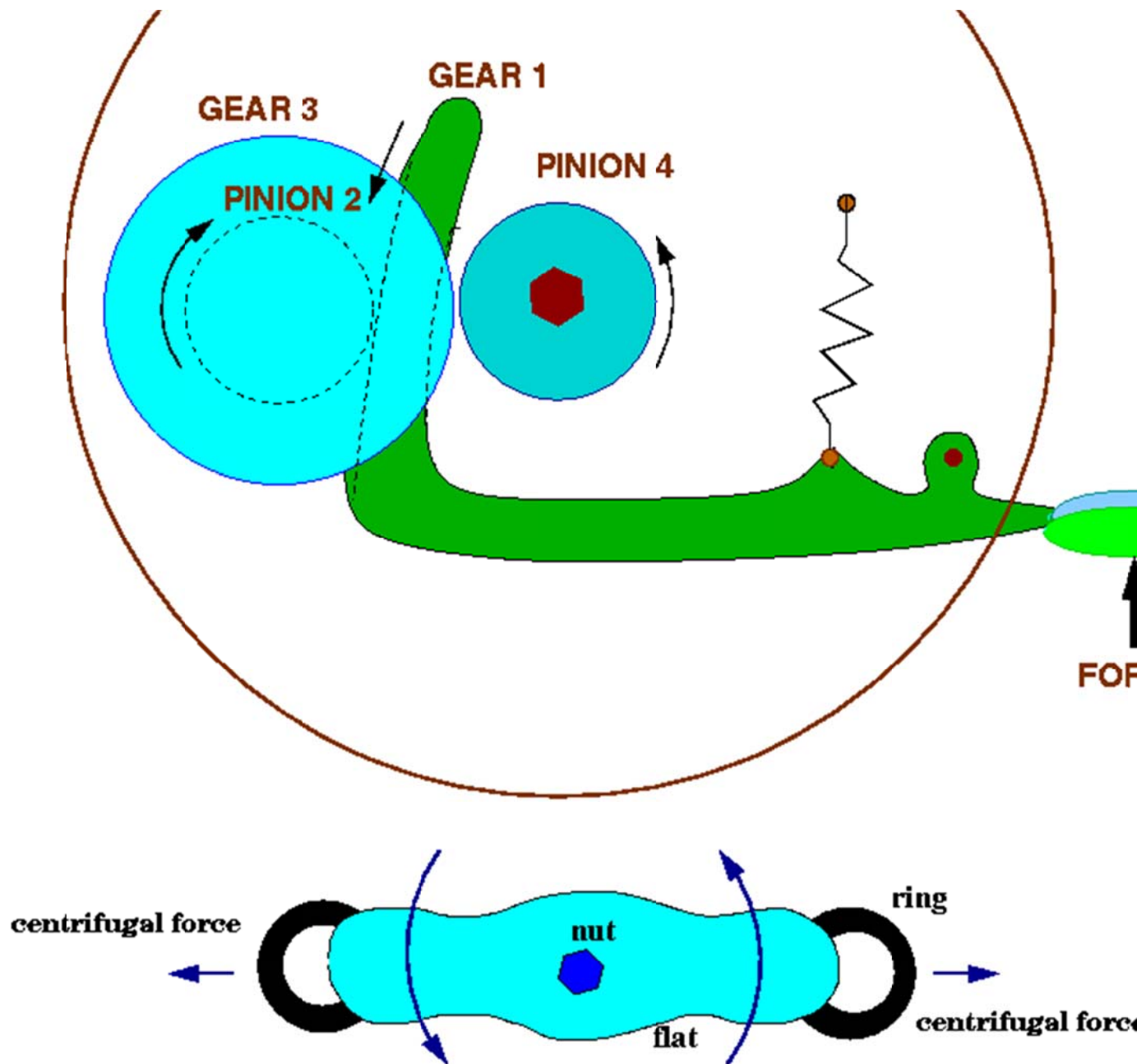
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## ● [COMPONENTS:](#)

- Two steel gears(1&3)
- Two brass pinions(2&4)
- One spring
- Two rings
- Bell cover
- Bell base
- Nuts and a central connecting flat



● **WORKING:** When we press the disk shaped protrusion on the right, the gear(1) drives the pinion (2). The pinion(2) is riveted to gear(3). Gear(3) in turn drives pinion(4) to which the flat is riveted. This component has two rings attached freely to its ends. These rings fly and hit the rim of the bell cover and produce sound vibrations. The spring attached brings back the gear(1) to its original rest position.



● **MANUFACTURING:** Most of the components have been made by *punching* and *sheet metal works*. The steel gears had been punched while the two small brass gears have been forged. The components have then been twisted and made in to the right shape. The bell top cover has been forged in to a dome shape. A protrusion looking towards the inside of the dome has been created towards

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SUGESIONS FOR IMPROVEMENT

● The two rings which, hit the rim of the bell to produce vibrations, could be made heavier by making them thicker or using a more heavier metal to make them. This will produce stronger vibrations and louder sound.

● The frequency at which the two rings hit the rim of the bell is depends upon the number of teeth in the gear<sup>3</sup>. The sound quality will be improved if we increase the number of teeth in gear<sup>3</sup>.

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## **HISTORY OF BELL**

The *Bell* can be defined as a hollow vessel usually of metal, but sometimes of horn, wood, glass, or clay, struck near the rim by an interior clapper or exterior hammer or mallet to produce a ringing sound. Bells may be categorized as idiophones, instruments sounding by the vibration of resonant solid material, and more broadly as percussion instruments. The shape of bells depends on cultural environment, intended use, and material construction. The walls vary from straight to convex, concave, hemispherical, barrel shaped (as in East Asia), and tulip shaped with sound bow (the bulge near the rim), as are all tower bells the West. In cross section they may be round, square, rectangular, elliptical, or many-sided. Chinese bells often lotus-shaped rims.

The strongest sound-producing vibration of bells occur near the rim, in contrast to hollow gongs, the vibrations of which are strongest in the centre. The acoustical structure of the bell sound is complex and has been completely understood only in modern times. All bells contain an array of *partials*, or sound wave frequencies of various pitches, but the tone of a musical bell consists of both harmonious partials and higher inharmonious partials.

Bells are widely distributed geographically and usually possess a clearly defined cultural status. Legends surround them, and beliefs around concerning their special powers—to induce rain or to dissolve storm clouds; to thwart demons when worn as amulets or to invoke curses and lift spells. The Chinese rang bells to communicate directly with the spirits, and in Russian orthodoxy, bells directly addressed the deity—hence, huge ones were cast by both peoples to lend greater authority. In both Buddhism and Christianity, bells are consecrated before being used liturgically, and in East Asia the fading tone of the bell is considered spiritually significant. In Roman Catholicism, bells have symbolized paradise and the voice of God.

Among the most basic and widespread uses of bell is signalling—marking significant points of rituals, calling to worship, tolling the hours, announcing events, rejoicing, warning, and mourning. In Christian and Asiatic Buddhist monasteries, bells regulate daily routine, and medieval and Christian bells were named according to purpose: *squilla* for the refectory, *nola* for the choir, and so forth.

The ancient Chinese were the first to employ sequences of bells musically; such sequences are termed chimes, or *pien chumg*. In the West since the 9th century, small sets of bells in

stationary suspension and generally tuned diatonically(to the seven-note scale)have been common.Sets of tuned bells numbering at least 23 termed *carillons*.Sets of handbells ranging up to five octaves have been popular in England and the U.S. since the 19th century as a group method for producing melodies and simple harmonics.In the main the liurgical and utilitarian functions of bells have greatly diminished,whereas their musical usage has increased.

In bell founding,molten metal(usually bronze) is poured into a mould of an inner core and outer mould or cope cotoured to a bell's profile.Most moulds are faced ewith loam,those for handbells with sand.The liquid metal ,heated to about 1,100 deg.centigrade enters a hole at the top while being tamped (driven by a series of low blows) down through another.Large bells require a week or two to cool.If a certain pitch is required ,small amounts of metal are ground from the bell's inner wall as it revolves.Bell metal or bronze is an alloy of copper and tin.Tin content may range from 13% in weight to25%,rarely more.Tin increasesbrittleness,and large bells contain less than small ones do.

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## Creative Designs





The above pictures have been downloaded from the site <http://www.yws.tw>.

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