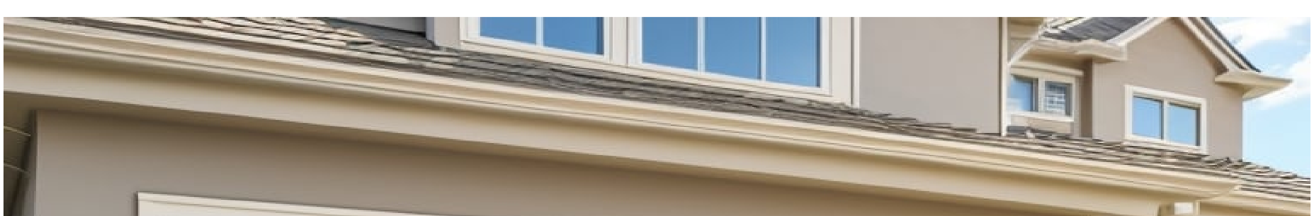
- Creating an Annual Garage Door Maintenance Calendar

  Creating an Annual Garage Door Maintenance Calendar   Visual Inspection Points for Door Hardware   Lubrication Guide for Rollers Hinges and Springs   Testing Door Balance Without Removing Hardware   Checking Safety Reverse Function for Compliance   Tightening Hardware to Reduce Door Noise   Cleaning Tracks for Smooth Door Travel   Seasonal Adjustments for Garage Door Operation   Logging Cycle Counts to Predict Part Replacement   Evaluating Weather Seals During Routine Service   Documenting Maintenance for Warranty Protection   Preparing Your Garage Door for Winter Conditions

- Decoding UL 325 Requirements for Garage Door Systems

  Decoding UL 325 Requirements for Garage Door Systems   Understanding ANSI DASMA Standards for Safe Operation   Key Points of EN 13241 in Residential Door Installations   Importance of Auto Reverse in Preventing Injuries   Manual Release Functions Every Owner Should Know   Sensor Alignment Procedures for Reliable Safety   Conducting Monthly Safety Tests on Garage Doors   Training Technicians on Lockout Tagout Procedures   Compliance Checklist for Commercial Garage Door Projects   Impact of New Regulations on Smart Door Upgrades   Documenting Safety Inspections for Insurance Claims   Educating Homeowners on Everyday Door Safety Practices

- About Us



Tightening Hardware to Reduce Door Noise

Okay, so youve got that annoying door. You know the one. Every time it opens or closes, it groans, rattles, or even worse, *squeaks*. Its like a tiny, rusty monster living in your doorframe, just waiting to disrupt the peace. Before you resign yourself to a life of tiptoeing around your own house, lets talk about tackling that noise with, well, tightening hardware.

It sounds simple, and often it is. Think of it like this: a noisy door is usually a door with loose connections. Things that are meant to be snug arent, and that creates vibration and movement, which translates to sound. The beautiful thing is, a lot of the time, you can fix this with a screwdriver and a little patience.

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First, be a detective. Wheres the noise actually coming from? Is it the hinges? Maybe the latch rubbing against the strike plate? Or could it be the doorknob itself, wobbling in its socket? Opening and closing the door slowly, and paying close attention, will help you pinpoint the culprit.

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Once youve identified the source, grab your trusty screwdriver (or maybe a few different sizes) and start tightening. Dont go crazy and strip the screws, but make sure theyre firm. Sometimes, screws will be so loose that they just spin. In that case, you might need to replace them with slightly longer or thicker screws to get a good grip. A little wood glue in the screw hole before you insert the new screw can also help it hold better, especially in older doors where the wood might be a bit worn.

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Pay special attention to the hinges. These are often the biggest offenders. If tightening the screws doesnt do the trick, you might need to consider lubricating them. A little bit of WD-40 or a similar penetrating oil can work wonders, but be careful not to overdo it, as it can drip and stain. There are also specialized hinge lubricants that are designed to be less messy.

Dont forget the strike plate – that metal plate on the doorframe where the latch goes. Make sure its securely fastened and that the latch is engaging properly. Sometimes, the strike plate might be misaligned, causing the latch to rub against it. You can usually adjust the strike plate slightly to fix this.

And finally, check the doorknob and handle. Make sure theyre firmly attached and that nothing is rattling around inside. Sometimes, a loose setscrew on the doorknob is all it takes to create a symphony of annoying noises.

Tightening hardware isnt always a glamorous fix, but its often the most effective and affordable one. Its about systematically eliminating the sources of noise by ensuring everything is properly secured. So, grab your tools, channel your inner handyman (or handywoman!), and silence that noisy door once and for all. Your ears will thank you.

Checking Safety Reverse Function for Compliance

About Garage (residential)

"Garage (house)" redirects here. For the music style, see Garage house.

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The Hermitage garage by Nicholas II in The State Hermitage, Saint Petersburg, Russia

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Garage - in the style of the new objectivity - Frankfurt am Main

A 1901 newspaper article discussing a name for a private collection of automobiles

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A 1901 newspaper article discussing a name for a private collection of automobiles, which mentions the word "garage" as being a possible choice except

> that that word was already in use in the broader sense of a place to store and repair them. Today the word *garage* has both senses; for example, *Jay Leno's Garage* is a series about his collection and other interesting collections, not merely the buildings that contain them.

A residential **garage** (UK: /Ë ˆÉ¡ærÉ‘ËÊ', –rÉ‘ËdÊ', –rÉªdÊ'/ *GARR-ahzh, -â• ahj, -â•,ij*

US: /É¡É™Ë ˆrÉ‘ËÊ', –rÉ‘ËdÊ'/ *gÉ™-RAHZH, -â•RAHJ*) is a walled, roofed structure with a door for storing a vehicle or vehicles that may be part of or attached to a home ("attached garage"), or a separate outbuilding or shed ("detached garage"). Residential garages typically have space for one or two cars, although three-car garages are used. When a garage is attached to a house, the garage typically has an entry door into the house, called the *person door* or *man door*, in contrast with the wider and taller door for vehicles, called the garage door, which can be opened to permit the entry and exit of a vehicle and then closed to secure the vehicle. A garage protects a vehicle from precipitation, and, if it is equipped with a locking garage door, it also protects the vehicle(s) from theft and vandalism. Most garages also serve multifunction duty as workshops for a variety of projects, including painting, woodworking, and assembly. Garages also may be used for other purposes as well, such as storage or entertainment.

Some garages have an electrical mechanism to automatically open or close the garage door when the homeowner presses a button on a small remote control, along with a detector that stops the movement of the garage if something is in the way of closing. Some garages have enough space, even with cars inside, for the storage of items such as bicycles or a lawnmower; in some cases, there may even be enough space for a workshop or a man cave. Garages that are attached to a house may be built with the same external materials and roofing as the house. Garages that are not connected to the home may use a different style of construction from the house. Often in the Southern and rural United States garages not attached to the home and made from a timber frame with sheet metal coverings are known as "pole barns", but usually serve the same purpose as what is called a garage elsewhere. In some places, the term is used synonymously with "carport", though that term normally describes a structure that, while roofed, is not completely enclosed. A carport protects the vehicle to some degree from inclement weather, but it does not protect the vehicle from theft or vandalism.

The word *garage*, introduced to English in 1902, originates from the French word *garer*, meaning shelter.[1] By 1908 the architect Charles Harrison Townsend was commenting in *The Builder* magazine that "for the home of the car, we very largely use the French word 'garage', alternatively with what I think the more desirable English equivalent of 'motor house' ".[2] Today the word is polysemic because it can refer to a collection of vehicles as well as the building that contains them.

Residential garage insulation

[edit]

In northern climates, temperatures inside an uninsulated attached residential garage can decrease to freezing levels during the winter. Temperatures inside an uninsulated attached garage in temperate climates can reach uncomfortable levels during summer months. Extreme temperatures can be a source of energy waste and discomfort in adjoining living areas, due to heat transfer between the garage and those areas. Homes with an attached garage often experience this "interface" problem. Insulating the outside of the building against the elements without extending the insulation to the wall separating the garage from the house, and/or the other garage walls and roof, can be a costly mistake.[3]

In Australia

[edit]

Australian homes typically have a two, one and a half or double car garage, with some newer houses having a triple garage, with one double door and one single door. Prior to the 1970s most of them were detached from the house, usually set further back with the driveway leading up past the side of the house, common with old fibreboard houses, but not uncommon with earlier brick houses. The most common doors on these garages were either two wooden barn style doors with a standard sized access door on the side of the garage or the B&D Rolla Door, which is described below.

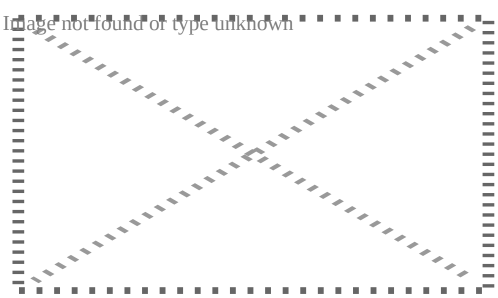
The most common garage door to date in Australia is the B&D Rolla Door, having been around since 1956 and still in heavy use today. They are a corrugated flexible but strong sheet steel door, sliding up tracks and rolling around a drum mounted above the door opening on the inside of the garage. These come in manual and remote controlled electric (known as the Control-a-Door), with conversion kits available. Locking is provided by a key lock in the centre of the door moving two square sliding lock bars in and out of holes in the door tracks, locking and unlocking it, or by the solenoid lock in the automatic motor.

Newer homes feature more American styled tilting panel lift doors which slide up onto a track on the ceiling via a motor and chain drive. Since the late 1970s most if not all garages are attached, and throughout the 80's it became more common to have an access door into the home from the garage where design permitted, whereas it is commonplace now. Most older unit (apartment) blocks in Australia have garages on the ground floor accessible through a common hallway and access doors, all leading into a common driveway. Newer ones now have underground parking.

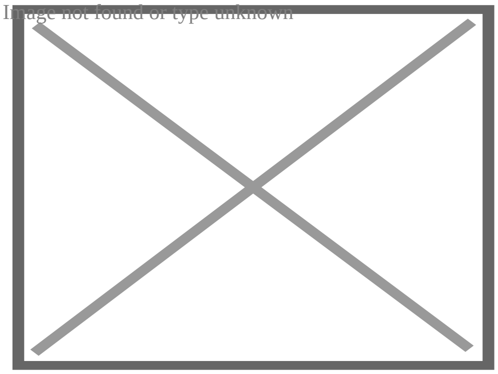
Australia has strict guidelines in place when building a home and the garage size must conform to the Australian Standards. The minimum size for a single garage is 3.0 m × 5.4 m (9.8 ft × 17.7 ft) and a double is 5.4 m × 5.4 m (17.7 ft × 17.7 ft). However, to comfortably fit two cars in a double garage it is typical to have a size of 6.0 m × 6.0 m (19.7 ft × 19.7 ft).[4]

In the United Kingdom

[edit]



Up-and-over garage door



Insulation of sectional garage door

British homes featuring a garage typically have a single or double garage either built into the main building, detached within the grounds (often in the back garden), or in a communal area.

Traditionally, garage doors were wooden, opening either as two leaves or sliding horizontally. Newer garages are fitted with metal up-and-over doors. Increasingly, in new homes, such doors are electrically operated.

Typically, a small British single garage is 8 by 16 feet (2.4 m × 4.9 m), a medium single garage is 9 by 18 feet (2.7 m × 5.5 m), and a large single garage is 10 by 20 feet (3.0 m × 6.1 m). Family sedans have become bigger than they were in the past, so the larger size has become a preferred option. A typical large family car like the Ford Mondeo is about 15 by 6 feet (4.6 m × 1.8 m), meaning that even with the larger size garage, it is necessary to park to one side to be able to open the driver's door wide enough to enter or exit the vehicle.

In the early days of the motor car, a garage played an important role in protecting the vehicle from the weather (particularly so as to reduce rust). It was also the case that early motor cars started more easily when they were warm,[5] so that keeping them in a garage rather than outside made it easier to get the engine going in the morning. Modern motor cars, however, are very well protected against rust, and modern engines start with no difficulty even in very cold conditions.

Early history

[edit]

The common term for these structures in the first decades of the 20th century was motor house. Many garages from before 1914 were pre-fabricated, typically by companies such as Norwich manufacturer Boulton & Paul Ltd. The style was usually in keeping with that of the house and its locale, however, they were mainly of timber construction and few have survived.[6]

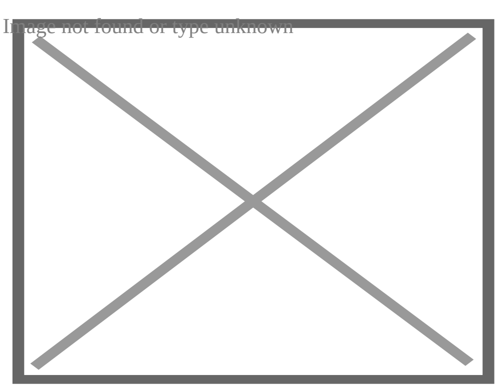
E. Keynes Purchase, "honorary architect" to what was to become the Royal Automobile Club, did a lot of work on them and recommended in *The Car Illustrated* in 1902, that they be of brick construction with cement floor, an inspection pit, good electric lighting and a pulley system for removing parts of the car (in the early days of motoring many car owners were mechanical and engineering enthusiasts).[7]

The architecture of garages was ignored in the architectural journals despite famous architects such as Edwin Lutyens, Richard Barry Parker and Edgar Wood all designing garages for their wealthy clients. Charles Harrison Townsend was one of the few architects who put pen to paper (in *The Builder* in 1908) on the subject and recommended that the walls be glazed brick for ease of washing, air gratings to be low (petrol fumes are heavier than air), and drains half open to avoid build-up of gases.[8]

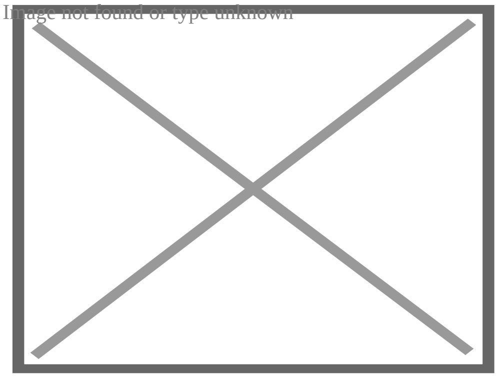
By 1910 corrugated iron and asbestos were being used instead of wood and garages became less imposing. From 1912 speculatively built houses in London were being built with motor houses.[9]

In North America

[edit]



Mobile homes with detached single car garages



Circa 1955 detached residential garage seen in Toledo, Ohio

Many garage doors open upward using an electric chain drive, which can often be automatically controlled from inside the resident's vehicle with a small radio transmitter.[10] Garages are connected to the nearest road with a driveway. Interior space for one or two cars is normal, and garages built after 1950 usually have a door that connects the garage directly to the interior of the house (an "attached garage"). Earlier garages were often detached and located in the back yard of the house, accessed either via a long driveway or from an alley.

In the past, garages were often separate buildings from the house ("detached garage"). On occasion, a garage would be built with an apartment above it, which could be rented out. As automobiles became more popular, the concept of attaching the garage directly to the home grew into a common practice. While a person with a separate garage must walk outdoors in every type of weather, a person with an attached garage has a much shorter walk inside a building.

Around the start of the 21st century, companies began offering "portable garages" in the United States. Typically, these garages are made of metal, wood or vinyl and do not connect to the house or other structure, much like the garage built before 1950. This portable garages usually have a strongly reinforced floor to hold a heavy vehicle. Garages are also produced as composite fabric garages with metal frames that are lightweight and portable garage compared to traditional brick-and-mortar or metal garage structures.[11]

Over the past fifteen years, the portable garage has further evolved into a modular garage or a partially prefabricated structure. The modular garage comes from a factory that assembles the garage in two sections and combines the two sections on location. Partially prefabricated garages are often larger and might even include an attic space or a second floor. Sections of the garage are preassembled and then setup on site over a few days time.[12] The Amish have become popular builders of portable, modular and partially prefabricated garages.

Common Garage Sizes in the United States

[edit]

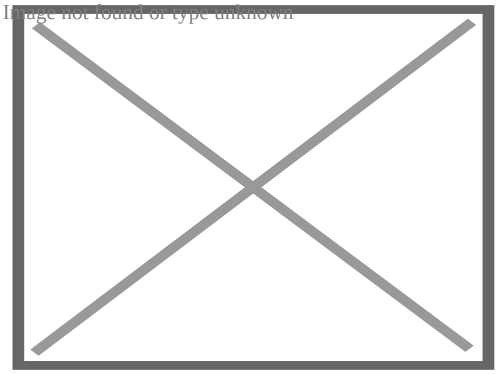
Garage sizes in the United States vary depending on the number of vehicles they are designed to accommodate. While dimensions can differ based on specific needs and local building codes, typical sizes are as follows:

- One-car garage: Usually 12 to 18 feet wide and 20 to 30 feet deep, with a total area of 240 to 540 square feet.
- Two-car garage: Commonly 20 to 24 feet wide, maintaining the same depth, and covering 360 to 660 square feet.
- Three-car garage: Typically 30 to 36 feet wide, providing 600 to 1,260 square feet of space.
- Four-car garage: The largest standard size, ranging from 40 to 48 feet wide, with a total area of 800 to 1,600 square feet.

These dimensions offer enough space not only for vehicles but also for storage and accessibility. Garage sizes may vary depending on design preferences, vehicle types, and additional space requirements.[13]

Post frame garages

[edit]
See also: Barndominium



Post frame garage attached to traditional frame house

Often in more rural settings, detached post-frame garages are used to store farm and workshop equipment and can either be cold storage[14] or insulated for warm storage.[15][16]

Notable garages

[edit]

The first planned private garages appeared long before 1900. Early examples of planned public garages appeared at the same time. The first recorded public parking garage in the US (*Electric Vehicle Company Garage*,[17] Chicago) was built in 1898, in the UK (*Christal Palace Garage*,[18] London) in 1900 and in Germany (*Großgarage der Automüller G.m.b.H.*,[19] Berlin-Wilmersdorf) in 1901.

Possibly the oldest existing garage in the United Kingdom is in Southport Lancashire. It was the first motor house or garage to be depicted in an English motoring journal and was in The Autocar of 7 October 1899. It was owned by Dr W.W. Barratt, a local doctor and motoring pioneer and specially designed for his house at 29 Park Crescent Hesketh Park. A two-storey building that matched the style of the house; the ground floor garage having a concrete floor, heating, electric lighting, an engine pit and was fully equipped. The motor house is now in residential use.[20]

One of the oldest surviving private garages in Germany today is the 1903 finished *Automobil-Remise* (automobile carriage house) of Villa Esche by Henry van de Velde in Chemnitz. Carl Benz, the inventor of the automobile, had a tower built for himself in 1910, on the first floor a room for studying, on the ground floor car parking space. It still exists in Ladenburg, Germany.

Gallery of notable garages

[edit]

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  Garage of HÃ´tel Brion (1904)

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  Garage of Hôtel
  Brion (1904)

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- ### Garages in Nizhny Novgorod

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Garages in Nizhny Novgorod

Old garages in Mannheim

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Old garages in
Mannheim

Carhouses

[edit]

Garages in the United States and Canada used to store streetcars and buses are often referred to as carhouses or car barns. These storage facilities are either metal or brick structures used to store streetcars or buses away from the elements. In Britain they are referred to as bus depots or depots.

See also

[edit]

- Carport
- Carriage house
- Parking
- Proof-of-parking

References

[edit]

1. **^** *The Shorter Oxford Dictionary* (1973)
2. **^** Minnis 2010, p. 74.
3. **^** "How to make your home energy efficient"; Howstuffworks.com

4. ^ *Berenice O. (17 August 2018). "Single & Double Garage Size (How Much Do You Need?)". BuildSearch. Retrieved 2018-12-13.*
5. ^ *"Starting Old Cars". Archived from the original on 2023-02-20. Retrieved 2013-05-24. " This whole operation takes a certain amount of time. On a 50-degree day, for instance, the car won't operate normally for at least 5 minutes of driving. On colder days you might spend 10-15 minutes "nursing" the car until it warms up to normal operating temperature."*
6. ^ Minnis 2010, pp. 77–78.
7. ^ Minnis 2010, p. 80.
8. ^ Minnis 2010, pp. 81–83.
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10. ^ *"How Do Garage Door Remotes Work". garage-door.com. 2019. Archived from the original on 2021-09-22. Retrieved 2019-10-16.*
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16. ^ *"Post Frame Building Basics :: Sutherlands".*
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18. ^ Kathryn A. Morrison, John Minnis: *Carscapes: The Motor Car, Architecture and Landscape in England*, New Haven/London 2012, p. 167
19. ^ René Hartmann: *Die Hochgarage als neue Bauaufgabe – Bauten und Projekte in Berlin bis 1933* (Magisterarbeit), Technische Universität Berlin 2009
20. ^ Minnis 2010, pp. 75–76.

- *Minnis, John (2010). "Practical yet Artistic: The Motor House 1895–1914". In Brandwood, Geoffrey K. (ed.). Living Leisure and Law: Eight Building Types in England 1800–1914. Reading: Spire Books in association with the Victorian Society. ISBN 9781904965-27-5. OCLC 835667261.*

External links

[edit]

- Image not found or type unknown The dictionary definition of *garage* at Wiktionary
- Image not found or type unknown Media related to Garages at Wikimedia Commons

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Rooms and spaces of a house

Shared rooms

- Bonus room
- Common room
- Den
- Dining room
- Family room
- Garret
- Great room
- Home cinema
- Keeping room
- Kitchen
    - dirty kitchen
    - kitchenette
- Living room
- Gynaeceum
    - harem
- Andron
    - man cave
- Recreation room
    - billiard room
- Shrine
- Study
- Sunroom

Private rooms

- Bathroom
    - toilet
- Bedroom / Guest room
    - closet
- Bedsit / Miniflat
- Boudoir
- Cabinet
- Nursery

Spaces

- Atrium
- Balcony
- Breezeway
- Conversation pit
- Cubby-hole
- Deck
- Elevator
  - dumbwaiter
- Entryway/Genkan
- Fireplace
  - hearth
- Foyer
- Hall
- Hallway
- Inglenook
- Lanai
- Loft
- Loggia
- Overhang
- Patio
- Porch
  - screened
  - sleeping
- Ramp
- Secret passage
- Stairs/Staircase
- Terrace
- Veranda
- Vestibule

Technical, utility and storage	○ Attic ○ Basement ○ Carport ○ Cloakroom ○ Closet ○ Crawl space ○ Electrical room ○ Equipment room ○ Furnace room / Boiler room ○ Garage ○ Janitorial closet ○ Larder ○ Laundry room / Utility room / Storage room ○ Mechanical room / floor ○ Pantry ○ Root cellar ○ Semi-basement ○ Storm cellar / Safe room ○ Studio ○ Wardrobe ○ Wine cellar ○ Wiring closet ○ Workshop

Great house areas	◦ Antechamber
	◦ Ballroom
	◦ Kitchen-related
	    ◦ butler's pantry
	    ◦ buttery
	    ◦ saucery
	    ◦ scullery
	    ◦ spicery
	    ◦ still room
	◦ Conservatory / Orangery
	◦ Courtyard
	◦ Drawing room
	◦ Great chamber
	◦ Great hall
	◦ Library
	◦ Long gallery
	◦ Lumber room
	◦ Parlour
	◦ Sauna
	◦ Servants' hall
	◦ Servants' quarters
	◦ Smoking room
	◦ Solar
	◦ State room
	◦ Swimming pool
	◦ Turret
	◦ Undercroft

Other

- Furniture
- Hidden room
- House
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- Multi-family residential
- Secondary suite
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- Terraced
- Detached
- Semi-detached
- Townhouse
- Studio apartment

Architectural elements	- Arch
	- Balconet
	- Baluster
	- Belt course
	- Bressummer
	- Ceiling
	- Chimney
	- Colonnade / Portico
	- Column
	- Cornice / Eaves
	- Dome
	- Door
	- Ell
	- Floor
	- Foundation
	- Gable
	- Gate
	    - Portal
	- Lighting
	- Molding
	- Ornament
	- Plumbing
	- Quoins
	- Roof
	    - shingles
	- Roof lantern
	- Sill plate
	- Style
	    - list
	- Skylight
	- Threshold
	- Transom
	- Vault
	- Wall

Related

- Backyard
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- Front yard
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  - roof garden
- Home
- Home improvement
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- Shed
- Tree house

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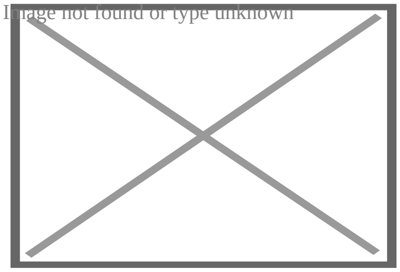
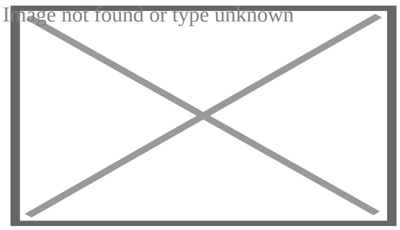
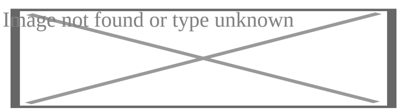
About Spring (device)



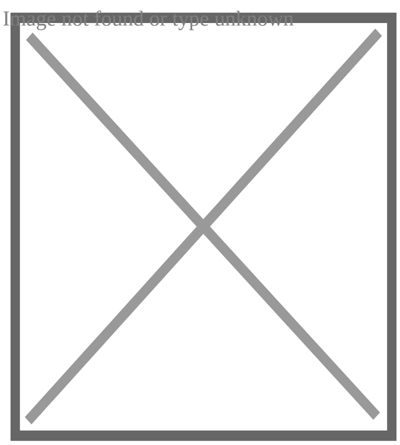
Helical coil springs designed for tension



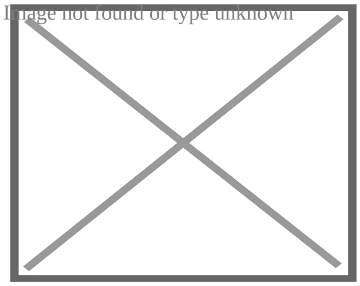
A heavy-duty coil spring designed for compression and tension



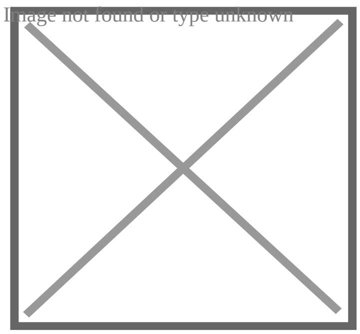
The English longbow – a simple but very powerful spring made of yew, measuring 2 m (6 ft 7 in) long, with a 470 N (105 lbf) draw weight, with each limb functionally a cantilever spring.



Force (F) vs extension (s).[*citation needed*] Spring characteristics: (1) progressive, (2) linear, (3) degressive, (4) almost constant, (5) progressive with knee



A machined spring incorporates several features into one piece of bar stock



Military booby trap firing device from USSR (normally connected to a tripwire) showing spring-loaded firing pin

A **spring** is a device consisting of an elastic but largely rigid material (typically metal) bent or molded into a form (especially a coil) that can return into shape after being compressed or extended.[1] Springs can store energy when compressed. In everyday use, the term most often refers to coil springs, but there are many different spring designs. Modern springs are typically manufactured from spring steel. An example of a non-metallic spring is the bow, made traditionally of flexible yew wood, which when drawn stores energy to propel an arrow.

When a conventional spring, without stiffness variability features, is compressed or stretched from its resting position, it exerts an opposing force approximately proportional to its change in length (this approximation breaks down for larger deflections). The *rate* or *spring constant* of a spring is the change in the force it exerts, divided by the change in deflection of the spring. That is, it is the gradient of the force versus deflection curve. An extension or compression spring's rate is expressed in units of force divided by distance, for example or N/m or lbf/in. A torsion spring is a spring that works by twisting; when it is twisted about its axis by an angle, it produces a torque proportional to the angle. A torsion spring's rate is in units of torque divided by angle, such as N·m/rad or ft·lbf/degree. The inverse of spring rate is compliance, that is: if a spring has a rate of 10 N/mm, it has a compliance of 0.1 mm/N. The stiffness (or rate) of springs in parallel is additive, as is the compliance of springs in series.

Springs are made from a variety of elastic materials, the most common being spring steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after manufacture. Some non-ferrous metals are also used, including phosphor bronze and titanium for parts requiring corrosion resistance, and low-resistance beryllium copper for springs carrying electric current.

History

[edit]

Simple non-coiled springs have been used throughout human history, e.g. the bow (and arrow). In the Bronze Age more sophisticated spring devices were used, as shown by the spread of tweezers in many cultures. Ctesibius of Alexandria developed a method for making springs out of an alloy of bronze with an increased proportion of tin, hardened by hammering after it was cast.

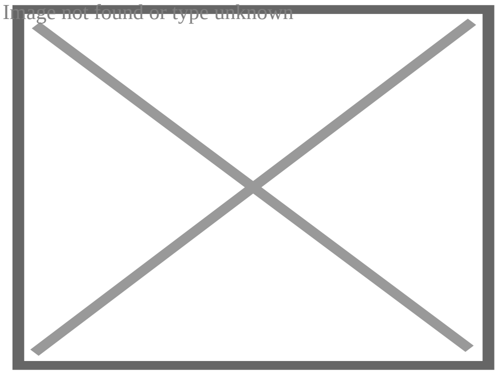
Coiled springs appeared early in the 15th century,[2] in door locks.[3] The first spring powered-clocks appeared in that century[3][4][5] and evolved into the first large watches by the 16th century.

In 1676 British physicist Robert Hooke postulated Hooke's law, which states that the force a spring exerts is proportional to its extension.

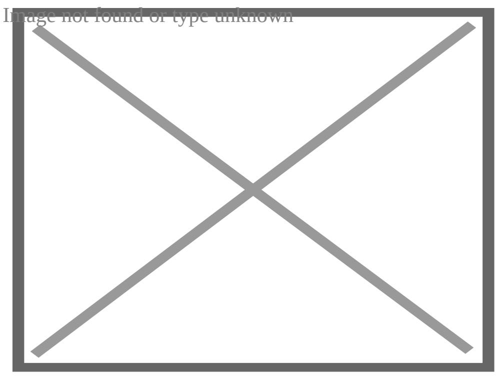
On March 8, 1850, John Evans, Founder of John Evans' Sons, Incorporated, opened his business in New Haven, Connecticut, manufacturing flat springs for carriages and other vehicles, as well as the machinery to manufacture the springs. Evans was a Welsh blacksmith and springmaker who emigrated to the United States in 1847, John Evans' Sons became "America's oldest springmaker" which continues to operate today.[6]

Types

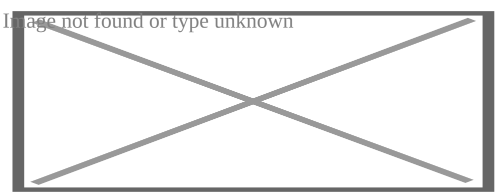
[edit]



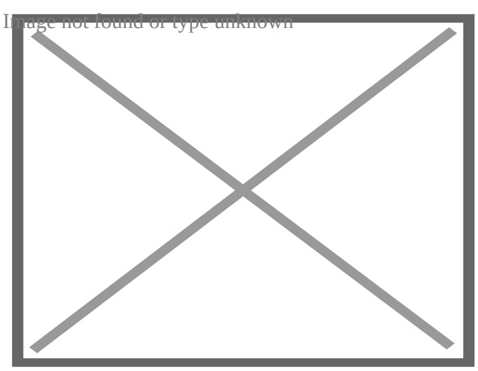
A spiral torsion spring, or hairspring, in an alarm clock.



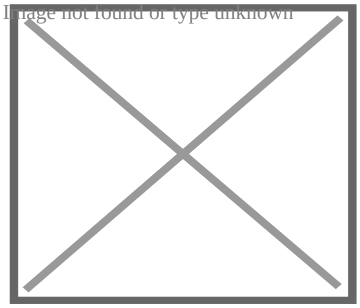
Battery contacts often have a variable spring



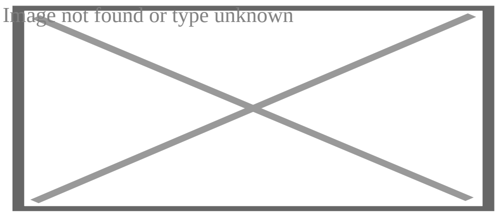
A volute spring. Under compression the coils slide over each other, so affording longer travel.



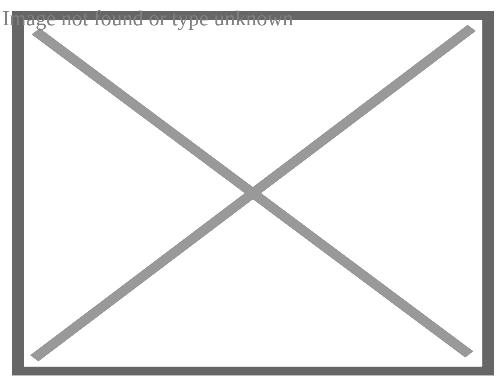
Vertical volute springs of Stuart tank



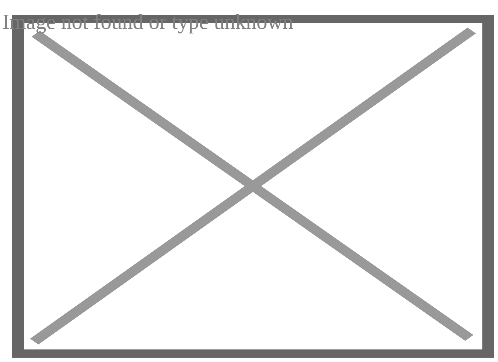
Selection of various arc springs and arc spring systems (systems consisting of inner and outer arc springs).



Tension springs in a folded line reverberation device.



A torsion bar twisted under load



Leaf spring on a truck

Classification

[edit]

Springs can be classified depending on how the load force is applied to them:

Tension/extension spring

The spring is designed to operate with a tension load, so the spring stretches as the load is applied to it.

Compression spring

Designed to operate with a compression load, so the spring gets shorter as the load is applied to it.

Torsion spring

Unlike the above types in which the load is an axial force, the load applied to a torsion spring is a torque or twisting force, and the end of the spring rotates through an angle as the load is applied.

Constant spring

Supported load remains the same throughout deflection cycle[7]

Variable spring

Resistance of the coil to load varies during compression[8]

Variable stiffness spring

Resistance of the coil to load can be dynamically varied for example by the control system, some types of these springs also vary their length thereby providing actuation capability as well [9]

They can also be classified based on their shape:

Flat spring

Made of a flat spring steel.

Machined spring

Manufactured by machining bar stock with a lathe and/or milling operation rather than a coiling operation. Since it is machined, the spring may incorporate features in addition to the elastic element. Machined springs can be made in the typical load cases of compression/extension, torsion, etc.

Serpentine spring

A zig-zag of thick wire, often used in modern upholstery/furniture.

Garter spring

A coiled steel spring that is connected at each end to create a circular shape.

Common types

[edit]

The most common types of spring are:

Cantilever spring
: A flat spring fixed only at one end like a cantilever, while the free-hanging end takes the load.

Coil spring
: Also known as a helical spring. A spring (made by winding a wire around a cylinder) is of two types:

- *Tension* or *extension springs* are designed to become longer under load. Their turns (loops) are normally touching in the unloaded position, and they have a hook, eye or some other means of attachment at each end.
- *Compression springs* are designed to become shorter when loaded. Their turns (loops) are not touching in the unloaded position, and they need no attachment points.
- *Hollow tubing springs* can be either extension springs or compression springs. Hollow tubing is filled with oil and the means of changing hydrostatic pressure inside the tubing such as a membrane or miniature piston etc. to harden or relax the spring, much like it happens with water pressure inside a garden hose. Alternatively tubing's cross-section is chosen of a shape that it changes its area when tubing is subjected to torsional deformation: change of the cross-section area translates into change of tubing's inside volume and the flow of oil in/out of the spring that can be controlled by valve thereby controlling stiffness. There are many other designs of springs of hollow tubing which can change stiffness with any desired frequency, change stiffness by a multiple or move like a linear actuator in addition to its spring qualities.

Arc spring

A pre-curved or arc-shaped helical compression spring, which is able to transmit a torque around an axis.

Volute spring

A compression coil spring in the form of a cone so that under compression the coils are not forced against each other, thus permitting longer travel.

Balance spring

Also known as a hairspring. A delicate spiral spring used in watches, galvanometers, and places where electricity must be carried to partially rotating devices such as steering wheels without hindering the rotation.

Leaf spring

A flat spring used in vehicle suspensions, electrical switches, and bows.

V-spring

Used in antique firearm mechanisms such as the wheellock, flintlock and percussion cap locks. Also door-lock spring, as used in antique door latch mechanisms.[10]

Other types

[edit]

Other types include:

Belleville washer

A disc shaped spring commonly used to apply tension to a bolt (and also in the initiation mechanism of pressure-activated landmines)

Constant-force spring

A tightly rolled ribbon that exerts a nearly constant force as it is unrolled

Gas spring

A volume of compressed gas.

Ideal spring

An idealised perfect spring with no weight, mass, damping losses, or limits, a concept used in physics. The force an ideal spring would exert is exactly proportional to its extension or compression.[11]

Mainspring

A spiral ribbon-shaped spring used as a power store of clockwork mechanisms: watches, clocks, music boxes, windup toys, and mechanically powered flashlights

Negator spring

A thin metal band slightly concave in cross-section. When coiled it adopts a flat cross-section but when unrolled it returns to its former curve, thus producing a constant force throughout the displacement and *negating* any tendency to re-wind. The most common application is the retracting steel tape rule.[12]

Progressive rate coil springs

A coil spring with a variable rate, usually achieved by having unequal distance between turns so that as the spring is compressed one or more coils rests against its neighbour.

Rubber band

A tension spring where energy is stored by stretching the material.

Spring washer

Used to apply a constant tensile force along the axis of a fastener.

Torsion spring

Any spring designed to be twisted rather than compressed or extended.[13] Used in torsion bar vehicle suspension systems.

Wave spring

various types of spring made compact by using waves to give a spring effect.

Main article: Wave spring

Physics

[edit]

Hooke's law

[edit]

Main article: Hooke's law

An ideal spring acts in accordance with Hooke's law, which states that the force with which the spring pushes back is linearly proportional to the distance from its equilibrium length:

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$$F=-kx$$

where

- Image not found or type unknown $\displaystyle x$ is the displacement vector – the distance from its equilibrium length.
- Image not found or type unknown $\displaystyle F$ is the resulting force vector – the magnitude and direction of the restoring force the spring exerts
- Image not found or type unknown $\displaystyle k$ is the **rate**, **spring constant** or **force constant** of the spring, a constant that depends on the spring's material and construction. The negative sign indicates that the force the spring exerts is in the opposite direction from its displacement

Most real springs approximately follow Hooke's law if not stretched or compressed beyond their elastic limit.

Coil springs and other common springs typically obey Hooke's law. There are useful springs that don't: springs based on beam bending can for example produce forces that vary nonlinearly with displacement.

If made with constant pitch (wire thickness), conical springs have a variable rate. However, a conical spring can be made to have a constant rate by creating the spring with a variable pitch. A larger pitch in the larger-diameter coils and a smaller pitch in the smaller-diameter coils forces the spring to collapse or extend all the coils at the same rate when deformed.

Simple harmonic motion

[edit]
Main article: Harmonic oscillator

Since force is equal to mass, *m*, times acceleration, *a*, the force equation for a spring obeying Hooke's law looks like:

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$$\displaystyle F=ma\quad \Rightarrow \quad -kx=ma.\,$$

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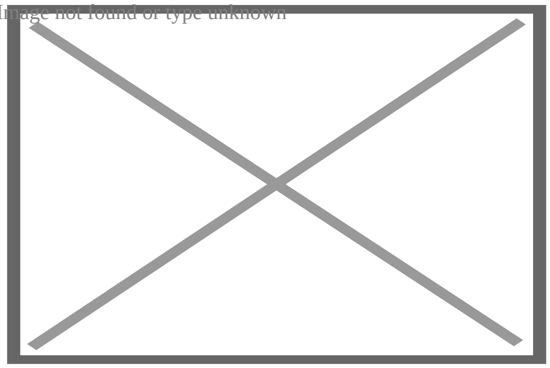

The displacement, *x*, as a function of time. The amount of time that passes between peaks is called the period.

The mass of the spring is small in comparison to the mass of the attached mass and is ignored. Since acceleration is simply the second derivative of x with respect to time,

\displaystyle -kx=m\frac d^2xdt^2.\,

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This is a second order linear differential equation for the displacement \displaystyle x Image not found or type unknown as a function of time. Rearranging:

\displaystyle \frac d^2xdt^2+\frac kmx=0,\,

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the solution of which is the sum of a sine and cosine:

\displaystyle x(t)=A\sin \left(t\sqrt \frac km\right)+B\cos \left(t\sqrt \frac km\right).\,

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\displaystyle A Image not found or type unknown and \displaystyle B Image not found or type unknown are arbitrary constants that may be found by considering the initial displacement and velocity of the mass. The graph of this function with \displaystyle B=0 Image not found or type unknown (zero initial position with some positive initial velocity) is displayed in the image on the right.

Energy dynamics

[edit]

In simple harmonic motion of a spring-mass system, energy will fluctuate between kinetic energy and potential energy, but the total energy of the system remains the same. A spring that obeys Hooke's law with spring constant *k* will have a total system energy *E* of:[14]

$$\displaystyle E=\left(\frac 12\right)kA^2$$

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Here, A is the amplitude of the wave-like motion that is produced by the oscillating behavior of the spring.

The potential energy *U* of such a system can be determined through the spring constant *k* and its displacement *x*:[14]

$$\displaystyle U=\left(\frac 12\right)kx^2$$

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The kinetic energy *K* of an object in simple harmonic motion can be found using the mass of the attached object *m* and the velocity at which the object oscillates *v*:[14]

$$\displaystyle K=\left(\frac 12\right)mv^2$$

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Since there is no energy loss in such a system, energy is always conserved and thus:[14]

$$\displaystyle E=K+U$$

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Frequency & period

[edit]

The angular frequency ▯ of an object in simple harmonic motion, given in radians per second, is found using the spring constant *k* and the mass of the oscillating object *m*[15]*:*

$$\displaystyle \omega =\sqrt \frac km$$

[14]

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The period *T*, the amount of time for the spring-mass system to complete one full cycle, of such harmonic motion is given by:[16]

\displaystyle T=\frac 2\pi \omega =2\pi \sqrt \frac mk

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The frequency *f*, the number of oscillations per unit time, of something in simple harmonic motion is found by taking the inverse of the period:[14]

\displaystyle f=\frac 1T=\frac \omega 2\pi =\frac 12\pi \sqrt \frac km

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Theory

[edit]

In classical physics, a spring can be seen as a device that stores potential energy, specifically elastic potential energy, by straining the bonds between the atoms of an elastic material.

Hooke's law of elasticity states that the extension of an elastic rod (its distended length minus its relaxed length) is linearly proportional to its tension, the force used to stretch it. Similarly, the contraction (negative extension) is proportional to the compression (negative tension).

This law actually holds only approximately, and only when the deformation (extension or contraction) is small compared to the rod's overall length. For deformations beyond the elastic limit, atomic bonds get broken or rearranged, and a spring may snap, buckle, or permanently deform. Many materials have no clearly defined elastic limit, and Hooke's law can not be meaningfully applied to these materials. Moreover, for the superelastic materials, the linear relationship between force and displacement is appropriate only in the low-strain region.

Hooke's law is a mathematical consequence of the fact that the potential energy of the rod is a minimum when it has its relaxed length. Any smooth function of one variable approximates a quadratic function when examined near enough to its minimum point as can be seen by examining the Taylor series. Therefore, the force – which is the derivative of energy with respect to displacement – approximates a linear function.

The force of a fully compressed spring is:

\displaystyle F_max=\frac Ed^4(L-nd)16(1+\nu)(D-d)^3n\

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where

- E – Young's modulus
- d – spring wire diameter
- L – free length of spring
- n – number of active windings
- \displaystyle \nu – Poisson ratio (Image not found or type unknown)
- D – spring outer diameter.

Zero-length springs

[edit]

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Simplified LaCoste suspension using a zero-length spring

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Spring length *L* vs force *F* graph of ordinary (+), zero-length (0) and negative-length (-) springs with the same minimum length L_0 and spring constant

Zero-length spring is a term for a specially designed coil spring that would exert zero force if it had zero length. That is, in a line graph of the spring's force versus its length, the line passes through the origin. A real coil spring will not contract to zero length because at some point the coils touch each other. "Length" here is defined as the distance between the axes of the pivots at each end of the spring, regardless of any inelastic portion in-between.

Zero-length springs are made by manufacturing a coil spring with built-in tension (A twist is introduced into the wire as it is coiled during manufacture; this works because a coiled spring *unwinds* as it stretches), so if it *could* contract further, the equilibrium point of the spring, the point at which its restoring force is zero, occurs at a length of zero. In practice, the manufacture of springs is typically not accurate enough to produce springs with tension consistent enough for applications that use zero length springs, so they are made by combining a *negative length* spring, made with even more tension so its equilibrium point would be at a *negative* length, with a piece of inelastic material of the proper length so the zero force point would occur at zero length.

A zero-length spring can be attached to a mass on a hinged boom in such a way that the force on the mass is almost exactly balanced by the vertical component of the force from the spring, whatever the position of the boom. This creates a horizontal pendulum with very long oscillation period. Long-period pendulums enable seismometers to sense the slowest waves from earthquakes. The LaCoste suspension with zero-length springs is also used in gravimeters because it is very sensitive to changes in gravity. Springs for closing doors are often made to have roughly zero length, so that they exert force even when the door is almost closed, so they can hold it closed firmly.

Uses

[edit]

- Airsoft gun
- Aerospace
- Retractable ballpoint pens

- Buckling spring keyboards
- Clockwork clocks, watches, and other things
- Firearms
- Forward or aft spring, a method of mooring a vessel to a shore fixture
- Gravimeters
- Industrial Equipment
- Jewelry: Clasp mechanisms
- Most folding knives, and switchblades
- Lock mechanisms: Key-recognition and for coordinating the movements of various parts of the lock.
- Spring mattresses
- Medical Devices[17]
- Pogo Stick
- Pop-open devices: CD players, tape recorders, toasters, etc.
- Spring reverb
- Toys; the Slinky toy is just a spring
- Trampoline
- Upholstery coil springs
- Vehicle suspension, Leaf springs

See also

[edit]

- Shock absorber
- Slinky, helical spring toy
- Volute spring

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External links

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- Smart Springs and their Combinations (patent)

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Machines

Classical simple machines	◦ Inclined plane ◦ Lever ◦ Pulley ◦ Screw ◦ Wedge ◦ Wheel and axle
Clocks	◦ Atomic clock ◦ Chronometer ◦ Pendulum clock ◦ Quartz clock
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About Coil spring

A coil spring is a mechanical gadget that commonly is used to store power and consequently release it, to take in shock, or to maintain a pressure between speaking to surface areas. It is made of a flexible material developed right into the form of a helix that goes back to its natural length when unloaded. Under tension or compression, the product (wire) of a coil spring undergoes torsion. The spring characteristics consequently rely on the shear modulus. A coil spring may also be utilized as a torsion springtime: in this case the springtime in its entirety undergoes torsion concerning its helical axis. The product of the spring is thereby subjected to a bending moment, either decreasing or boosting the helical span. In this setting, it is the Young's modulus of the product that identifies the springtime attributes.

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About Lake County

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https://www.google.com/maps/place//@41.387751771893,-87.354609418204,25.2z/data=!4m6!3m5!1sTraceback (most recent call last):!8m2!3d41.4237151!4d-87.34086459999999!16s%2F

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https://www.google.com/maps/dir/?api=1&origin=41.399738824157,-87.424028378515&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%

https://www.google.com/maps/dir/?api=1&origin=41.46975385927,-87.406779895863&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%

https://www.google.com/maps/dir/?api=1&origin=41.398122114322,-87.410758932333&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%

https://www.google.com/maps/dir/?api=1&origin=41.414268362669,-87.26959232664&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%2

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https://www.google.com/maps/dir/?api=1&origin=41.379040159809,-87.310530892481&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%

https://www.google.com/maps/dir/?api=1&origin=41.434455207201,-87.374629154765&destination=%2C+1305+Erie+Ct%2C+Crown+Point%2C+IN+46307%

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