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INDUSTRIAL DEVELOPMENT ORGANIZATION

# TECHNICAL REPORT – PATENT ANALYSIS

ENHANCING PRODUCTIVITY  
IN THE INDIAN BICYCLE SECTOR





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## LIST OF ABBREVIATIONS

<b>AT</b>	Austria	<b>IPC</b>	International Patent Classification
<b>AU</b>	Australia	<b>JP</b>	Japan
<b>BAGB</b>	Bicycle Association of Great Britain	<b>KR</b>	Korea
<b>CA</b>	Canada	<b>LED</b>	Light Emitting Diode
<b>CAGR</b>	Compound annual growth rate	<b>MCU</b>	Micro-programmed Control Unit
<b>CN</b>	China	<b>MSMEs</b>	Micro, Small and Medium Enterprises
<b>CPC</b>	Cooperative Patent Classification	<b>PCT</b>	Patent Cooperation Treaty
<b>DE</b>	Germany	<b>R &amp; D</b>	Research and Development
<b>EP</b>	European Patent Office	<b>TW</b>	Taiwan
<b>ES</b>	Spain	<b>UK</b>	United Kingdom
<b>FR</b>	France	<b>USA</b>	United States of America
<b>GB</b>	Great Britain	<b>USPTO</b>	United States Patent and Trademark Office
<b>INPADOC</b>	International Patent Documents	<b>WIPO</b>	The World Intellectual Property Organization
<b>INPASS</b>	Indian Patent Advanced Search System	<b>WO</b>	World Intellectual Property Organization
<b>IP</b>	Intellectual Property		
<b>IT</b>	Italy		



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## EXECUTIVE SUMMARY

UNIDO has implemented a project titled ‘Development and Adoption of Appropriate Technologies for Enhancing Productivity in the Bicycle and Bicycle Parts Sector’, in collaboration with the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India.

The project aimed to support the Indian bicycle sector by strengthening the capacity and capability of the nodal technical institution for the sector – the Research and Development Centre for Bicycle and Sewing Machines (RDCBSM), and the two industry associations - the All India Cycle Manufacturers Association (AICMA) and the United Cycle and Parts Manufacturers Association (UCPMA) - to provide better management and technical support to the Indian bicycle industry. The project looked to facilitate structured expert dialogue, transfer state-of-the-art technologies, and action a wide range of technical capacity building and knowledge sharing activities to strengthen the global competitiveness of the Indian bicycle sector.

The activities under the UNIDO bicycle project include: transfer of state-of-the-art technologies; technical capacity building and knowledge sharing activities (technical workshops, training of trainers, international study tours and fellowship training); twinning with international counterparts, and upgrading of the RDCBSM’s testing facilities.

In line with the above, a workshop was organized on ‘Patents and Intellectual Property Rights (IPRs) for the Bicycle Sector’, conducted on 2-3 June 2017, in collaboration with the Patent Facilitating Centre, the Technology Information Forecasting and Assessment Council (TIFAC), the Department of Science & Technology, and the Government of India. This technical report provides a detailed analysis of bicycle-related patents across various jurisdictions and trends that have driven inventions in the bicycle sector in various countries. Patents are a high-interest area for the RDCBSM, and as the nodal R&D institute for the sector, the organization must develop competencies in the management of its intellectual property and well-informed R&D activities. This technical report provides the necessary history, background information, patent search methodologies and analyses that would assist the RDCBSM in using patent databases for its research activities, as well as develop material for patents of its own.

UNIDO has implemented a project titled 'Development and Adoption of Appropriate Technologies for Enhancing Productivity in the Bicycle and Bicycle Parts Sector' in collaboration with the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India. The bicycle project aimed to support the Indian bicycle sector by strengthening the capacity and capability of the nodal technical institution for the sector - the Research and Development Centre for Bicycle and Sewing Machines (RDCBSM), and the two industry associations - the All India Cycle Manufacturers Association (AICMA) and the United Cycle and Parts Manufacturers Association (UCPMA) - to provide better management and technical support to the Indian bicycle industry.

The project looked to facilitate structured expert dialogue, transfer state-of-the-art technologies to the Indian bicycle sector, and a wide range of technical capacity building and knowledge sharing activities to bolster the capacity and capability of the RDCBSM and industry associations (AICMA and UCPMA) to enable them to better support the industry in enhancing its productivity performance and entering export markets.

To fulfil this objective, one of the activities of the project was to conduct technical workshops for the scientists and engineers of the RDCBSM. One of the six workshops organised in this direction was on 'Patents and Intellectual Property Rights (IPRs) for the Bicycle Sector', conducted on 2-3 June 2017.

The purpose of this report is to provide an overview of bicycle-related patent applications filed and published in five jurisdictions covering a period of ten years. The report aims to investigate the trends in patenting activity related to technologies used in manufacturing bicycles and their major parts. The study highlights the global scenario of the patenting activity in the bicycle sector and then narrows down to highlight trends in five major bicycle-producing countries: China, Taiwan, Korea, Japan and India.

Patents related to different technologies involved in manufacturing a mechanically driven cycle and its parts were searched based on a combined strategy that used International Patent Classification (IPC) codes along with selected keywords. This strategy was used to retrieve information on granted patents and patent applications that were published in the last 10 years, 2007-2017, relating to the bicycle sector. The Derwent



Innovation database was used that has patent data from 50 patent issuing authorities and 2 journal sources, i.e. data from over 80 countries. The corresponding Cooperative Patent Classification (CPC) was also referred to to supplement IPC search results.

Representative examples of 30 patent documents, belonging to different categories of bicycle technology, are provided in the annexure along with their abstracts. The focus of the report is to analyse the patents published in the last 10 years, vis-à-vis technologies they are associated with.

The report aims to provide the RDCBSM, as the nodal technical research institute for the bicycle sector in India, with a broad background of how to utilize patents and speed up the R&D process to facilitate further inventions. Intensive and extensive efforts are required in India to generate new knowledge through inventions in order to remain competitive, not only domestically but also globally. Educational institutions, research institutions and industries must be encouraged to carry out more research and development, making this a pertinent topic for the RDCBSM.

“ The project looked to facilitate structured expert dialogue, transfer state-of-the-art technologies to the Indian bicycle sector, and a wide range of technical capacity building and knowledge sharing activities to bolster the capacity and capability of the RDCBSM and industry associations (AICMA and UCPMA) to enable them to better support the industry in enhancing its productivity performance and entering export markets. ”

## 2.1. Bicycle Industry

The bicycle industry can comprehensively be characterized as the sector concerned with bicycles and cycling. It includes bicycle makers, part or component makers, and accessory makers. In addition, it includes wholesalers, retailers, associations, promoters and other specialists [1].

The bicycle industry is growing worldwide, and is expected to hit \$65 billion in global sales by 2019. More and more people are beginning to turn to cycling, not only as an effective and low-cost mode of transportation, but also as a recreational and fitness activity. Currently, there are about 2,000 companies involved in the manufacturing and distribution of bicycle components and complete bicycles, sold under approximately 150 different brands [2].

## 2.2. Brief History

People have envisioned bicycle-like contraptions since the sixteenth century. Even Leonardo da Vinci used to make sketches of vehicles with two wheels joined by a beam. Bicycles made of wood with a high seat called a 'hobby horse' became quite popular in the 1700s. As these did not have pedals, the rider was supposed to push against the ground to move forward. In 1816, the Germans made hobby horses steerable. By 1840 it was realized that the rider could balance without touching their feet on the ground, and hobby horses began to operate with

foot-powered treadles. The 1860s saw great leaps forward in bicycle design, as people added pedals, spokes, rubber wheels and gearshifts. The famous diamond shape was introduced in the 1880s, along with inflated rubber tubes in place of solid rubber tyres. However, the arrival of the revolutionary automobile quickly overshadowed the bicycle craze, though the two concepts were combined later on to develop the motorcycle. The bicycle industry boomed once again in the 1970s, as oil prices in the United States and other Western nations soared. Presently, electric bicycles and electric-assisted bicycles are increasingly making cycling a more viable transportation option for many people without involving the leg power [2].

## 2.3. Manufacturing Process

The most fundamental component of a bicycle is the diamond-shaped frame, which is formed by two triangles separated by a metal tube in the middle. Typically, steel alloy tubes form this diamond structure. Machines puncture and stretch a solid piece of steel until it molds into a seamless tube. The tubes are then welded together at high heat to construct the diamond frame. After going through an acidic pickling solution, to smooth and clean the metal, the frame slides through a spray paint chamber. Once the frame is complete, the manufacturer adds the rest of the components including: gearshifters; handlebars; brakes; seats; pedals; carriers; wheels, etc. Established production houses purchase these





individual components from other specialized manufacturing companies rather than producing at their own level [2].

## 2.4. Major Producers and Markets

China and Taiwan produce the majority of the world's bicycles and are responsible for 87% of global production. In 2012, China exported 59.1 million bicycles, most of which ended up in the United States, Japan and Indonesia. However, China and Taiwan are encouraging domestic consumption of bicycles as well.

The bicycle sector in both of these countries is quite distinct, as each has different specialties. China exports low-end recreational bicycles, usually with a retail value of less than \$100 in places like the United States. Taiwan focuses on high-end racing and mountain bicycles, which are usually sold at around \$400 [2]. The general patterns of global bicycle supply and demand are illustrated in Figure 2.1.

As per 2015 statistics, the USA bicycle market was sized at around six billion USD and around 17.4 million units of bicycles were sold there that year. Although USA-based manufacturers like Trek, Specialized and Redline are popular bicycle brands in the United States, the majority of products are manufactured abroad. Around 99% of bicycles sold in the United States are in fact imported from China and Taiwan [3].

In Australia, all major bicycle brands are manufactured overseas and imported into the country. In 2007, that number reached a record high of over 1.43 million units, before falling to 1.1 million in 2008, and recovering to 1.3 million units in 2013 [4].

In 2016, the Bicycle Association of Great Britain (BAGB) estimated that retail bicycle sales in the UK account for 50% of turnover

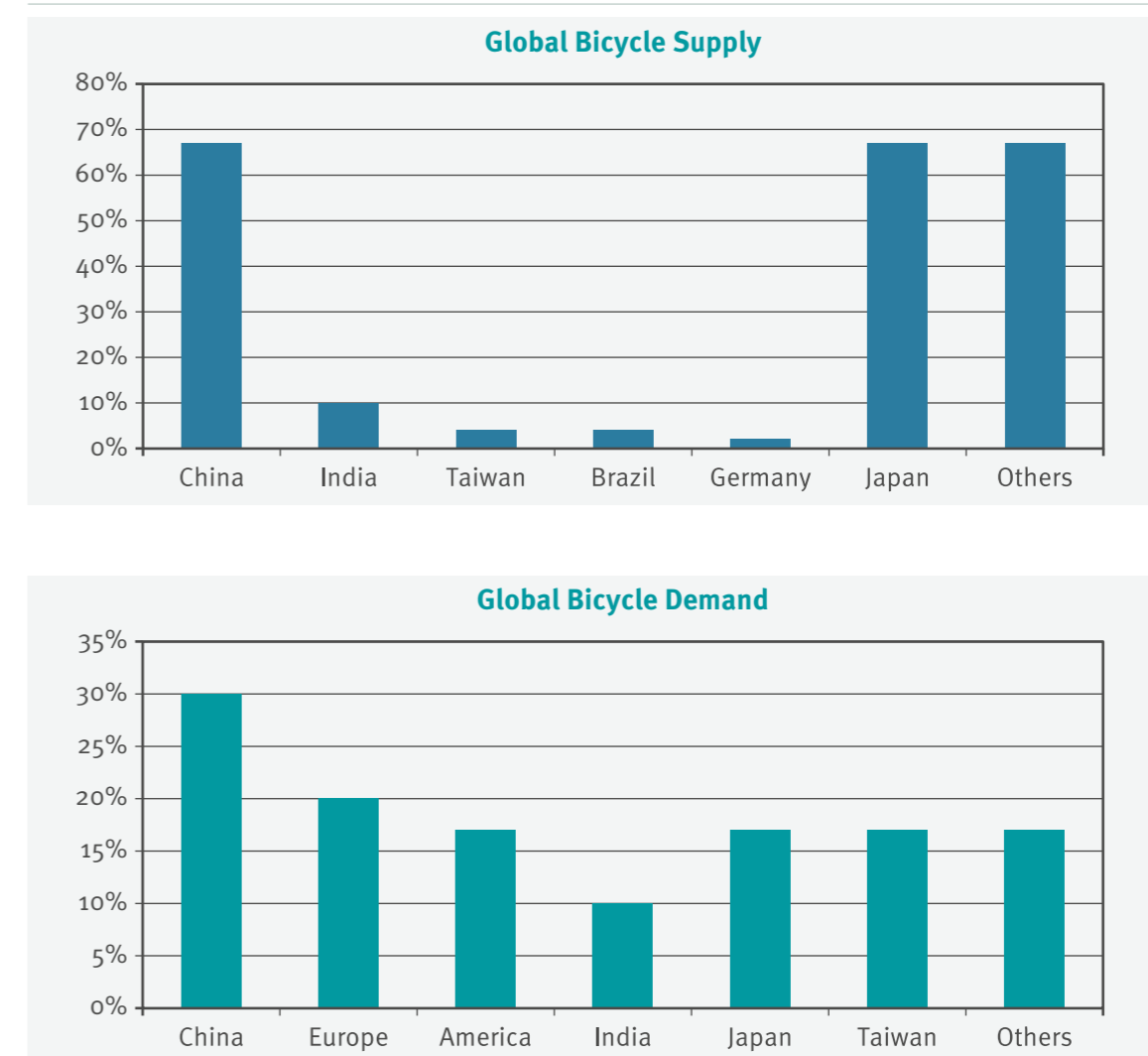
in the bicycle industry, with the remainder derived from the sale of bicycle parts, accessories and clothing. BAGB also estimated that 95% of bicycles sold to users in the UK are imported, with the remainder manufactured in the UK.

India is also one of the major contributors along with China and Taiwan [6]. Annually, India produces approximately 10% of the world's bicycles, which is estimated at 125 million units. Exports out of India are largely to Africa and the less developed economies and negligible to Western markets [7].

India, as one of the fastest growing economies in the world, is also witnessing a high demand for sports bicycles. The growing focus on fitness and health, and increasing trends of using cycles to commute to work is projected to drive sales of sports bicycles in the country in the coming years. Given the growing demand for sports bicycles in the country, many international players have introduced their products to the Indian bicycle market.

Although India has emerged as one of the major manufacturers of bicycles in the world, the country imports a considerable number of high-end or premium bicycles from other countries to address domestic demand for these bicycles. The Indian bicycle market is projected to grow at a compound annual growth rate (CAGR) of over 11%, during 2016-2021, on account of a growing population base, increasing discretionary spending, and rising health consciousness among the people. In India, cycling is being swiftly adopted as a means to stay fit and as a popular recreational activity. Furthermore, many of the state governments have started to construct dedicated bicycle lanes in major cities to encourage cycling, as an environmentally friendly means of transportation. This is also projected to drive sales of bicycles across the country in the coming years. [8]

Figure 2.1: Global bicycle supply vs. demand [9]



### 2.4.1. Scope of the report

The resurgence in the popularity of bicycles has resulted in an increasing demand for new cycling methods and designs which optimize the human power input. Due to increasing environmental concerns and an energy shortage there is a very strong incentive to find ways to allow people to move about using non-polluting human energy. Aside from being an alternative to motorized transportation, the bicycle has seen renewed interest due to the health benefits derived from the aerobics of cycling itself. Over the last several years, research in bicycling has

concentrated mainly on the biomechanics aspect, made evident from numerous publications in this area [10, 11].

In order to meet the competition in the global markets, manufacturers are trying to innovate to improve the quality and the features in their bicycles and also to reduce the cost and price of the product. Targeting the emerging market for lifestyle consumers, manufacturers are innovating in premium bicycles. Growth in the 'specials segment' (sport light roadsters, mountain terrain bicycles and children's bicycles) was higher than in the 'standard segment'



and this in turn opened up the opportunities for the bicycle industry. Different cycles are being made to cater to the needs of different demographic groups.

The purpose of this report is to investigate the patenting activity related to technologies used in the bicycle sector. It provides a general overview and analysis of all patent documents identified from the search. Information related to the key applicants and inventors, their history of patenting activity and their technology strengths are identified and included in this report. It also tries to identify the emerging technology areas, as well as some interesting patents in the bicycle sector, and summarizes the patenting activities in those areas.

## 2.5. History of Bicycle Patents

### 2.5.1. Evolution of the bicycle industry

Vehicles for human transport that have two haggles adjusted by the rider, go back to the mid-nineteenth century. The term ‘bicycle’ was instituted in France in the 1860s.

Figure 2.2: The Celerifere (1792)



Many individuals assert credit for inventing the primary bicycle. In fact, the historical backdrop of the bicycle suggests that many individuals contributed ideas and developments in the manufacturing of bicycles and parts thereof.

It was suggested that in 1792, a French man called Comte Mede de Sivrac invented a bicycle with a high seat that he named ‘Celerifere’. There were no pedals and the rider was said to have sat astride the machine and pushed it along using alternate feet [12]. However, it was reported that the two-wheeled Celerifere never existed and it was actually an error by the French columnist Louis Baudry de Saunier in 1891 [13, 14].

Around 1817, Baron Karl von Drais de Sauerbrun, in Germany, included a moveable controlling handle and called it the ‘Draisine’. The Baron invented the contraption, which consisted of two same-estimate, in-line wheels (the front one steerable) mounted in a casing to enable him to get around his illustrious gardens quicker. The gadget was impelled by pushing the feet against the ground and also became known as the ‘hobby horse made of wood’ [15].

Figure 2.3: The Draisine (1817)



There are conflicting reports whether Baron von Drais filed a patent for his Draisine when it was introduced in France, in 1818, where it ended up plainly known as the ‘velocipede’ (human powered vehicle with one or more wheels) [16].

The idea was picked up by various British cart wrights; the most striking was Denis Johnson of London who reported in late 1818 that he would offer an enhanced model. New names were presented when Johnson patented his machine ‘person on foot curri- cle’ or ‘velocipede’, however general society favoured epithets like ‘side interest horse’, after the youngsters’ toy, or ‘dandyhorse’, after the dandy men who frequently rode them. Johnson’s machine was a change on Drais’s, in effect outstandingly more exquisite; his wooden casing had a serpentine shape, rather than Drais’ straight one, permitting the utilization of bigger wheels without raising the rider’s seat [17].

The advancement that made the bike a genuine type of transportation was introduced by a Scottish metalworker around 1839. Kirkpatrick Macmillan included pedals to empower him to get up slopes and bicycles started to develop in notoriety from that point on. This machine was known as the velocipede (quick foot), yet was famously known as the ‘bone shaker’ as it was made entirely from wood at that point; later metal tyres were added [15].

However, the real improvement in bicycling advancements came in the 1860s, when the primary endeavours were made at including a driving component. This would be the start of the pedal bikes that are seen along roads and walkways everywhere throughout the world. These models started using revolving wrenches which were joined to the front wheel pedals to power the bike forward [17].

Figure 2.4: Denis Johnson’s Ladies Walking Machine (1818-19)



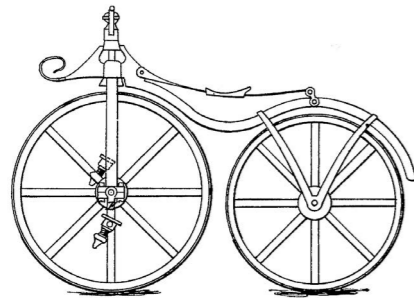
## 2.5.2. Major bicycling advancements

1

### U.S. Patent No. 59915 - Velocipede

Numerous courses of events put the date of the creation of the main velocipede with pedals at different points all through the 1860s. Maybe the earliest patents issued to secure one of these vehicles was U.S. Patent No. 59915, which is titled 'Velocipede.' The patent secures an innovation comprising of two haggles components for driving the wheels. In addition, the assembly incorporates an arrangement for controlling the velocipede and a segment that empowers a rider to adjust while driving the vehicle. As the speed of the vehicle expands, it ends up noticeably less demanding for a rider to adjust while driving. This patent was issued in November 1866 and was granted to Pierre Lallement of Paris, France [18].

Figure 2.5: Pierre Lallement's Improved velocipede (US59915A, 1866)



2

### Rear Wheel Driven Velocipede

Despite the fact that the 1860s can be viewed as the decade when the cutting edge advancement of the bike vigorously started, there are a few reports that place the innovation of a pedal-fuelled velocipede in Scotland amid the late 1830s. Kirkpatrick Macmillan, a metal forger from Dumfriesshire, is implied to have fabricated a rear wheel drive velocipede around 1839, where the vehicle was fuelled by a foot treadle. No patent was petitioned for the development, and there's not a great deal of confirmation to help this claim which initially originates from Macmillan's nephew [19].

3

### U.S. Patent No. 89341 - Tricycle

Various different design progressions were seen amid the velocipede time of bicycle improvement. Elastic tyres started to be initiated amid this time, and the earliest variants were nailed to the metal wheels of this model. Despite the fact that France grasped the velocipede in its early days, American riders took to this individual type of transportation by the late nineteenth century. U.S. Patent No. 89341, which is titled 'Improved Velocipede', was issued to James Rankin of Detroit, Michigan, in April 1869. This development profits by the presentation of metal balls into the assembling of velocipedes to help the movement of the treadles, or the foot pedals, which grant movement to the vehicle. This plan uses a grip gadget and pulley outline, which makes nonstop rotating movement to the axles, allowing smoother movement [20].

4

### U.S. Patent No. 356095 - High-Wheelers and Penny-Farthings

The high-wheeler bicycle was the logical extension of the bone shaker, the front wheel was enlarged to enable higher speeds (limited by the inside leg measurement of the rider), the rear wheel shrunk and the frame was made lighter. High-wheeler bicycle, penny-farthing or ordinary are largely terms used to depict an abnormal improvement in the field of bicycles amid the last parts of the nineteenth century. The size of the front wheel continued to grow as this allowed riders to travel further with each pedal rotation. Progressions in metallurgy permitted bicycle creators to make items which were made entirely out of lightweight metals, radically enhancing the transportability of these vehicles. They accomplished their most extreme fame in 1873 and 1887, and a few models achieved paces of up to 20 miles per hour. The construction of these penny-farthings, however, created a major safety concern that spurred later improvements towards the contemporary bicycle. The high-wheeler was front-wheel driven, and with the pedals connected to the front wheel the focal point of gravity for a rider was high and forward on the vehicle. This made numerous riders lose their balance when attempting to stay away from obstacles and tumble forward over the front wheel of the bicycle [21]. An example of a patent filed for these high-wheelers is U.S. Patent No. 356095, filed by Chaeles A. Bouck in 1887 [22].

Figure 2.7: The high-wheeler or penny-farthing, 1873-87

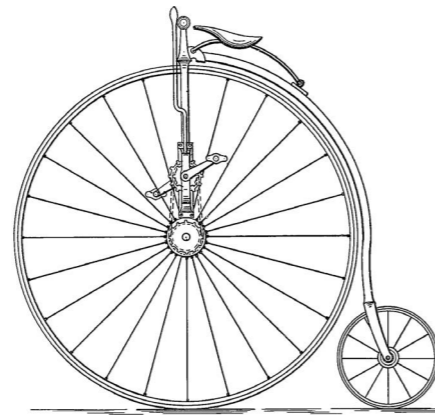
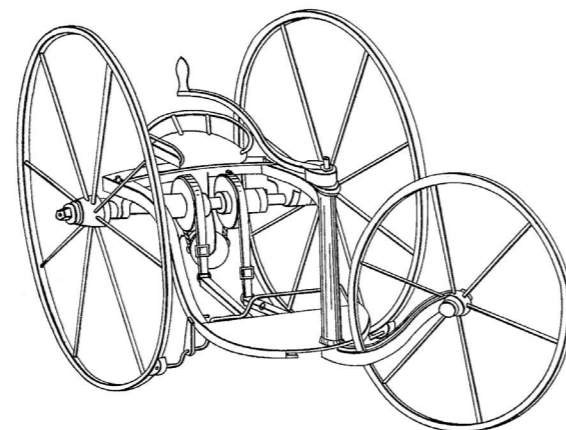


Figure 2.6: James Rankin's Velocipede (US89341A, 1869)



5

### Safety Bicycles: 1880s and 1890s

The improvement of the safety bicycle was ostensibly the most imperative change ever. It moved their utilization and open public perception from being a perilous toy for sporting young fellows to being an everyday transport instrument for men and women of all ages. In the mid-1880s, Englishman James Starley started to make what he called the 'safety bicycle', which had two likewise measured wheels and a major change – a chain and sprocket driven back wheel, with the pedals between the two wheels like current bikes. Nonetheless, the bikes still had the hard elastic tyres, and without the long, stun engrossing spokes, the ride they gave was significantly more awkward than any of the high wheel outlines [23].

Figure 2.8: McCammon safety bicycle, 1884

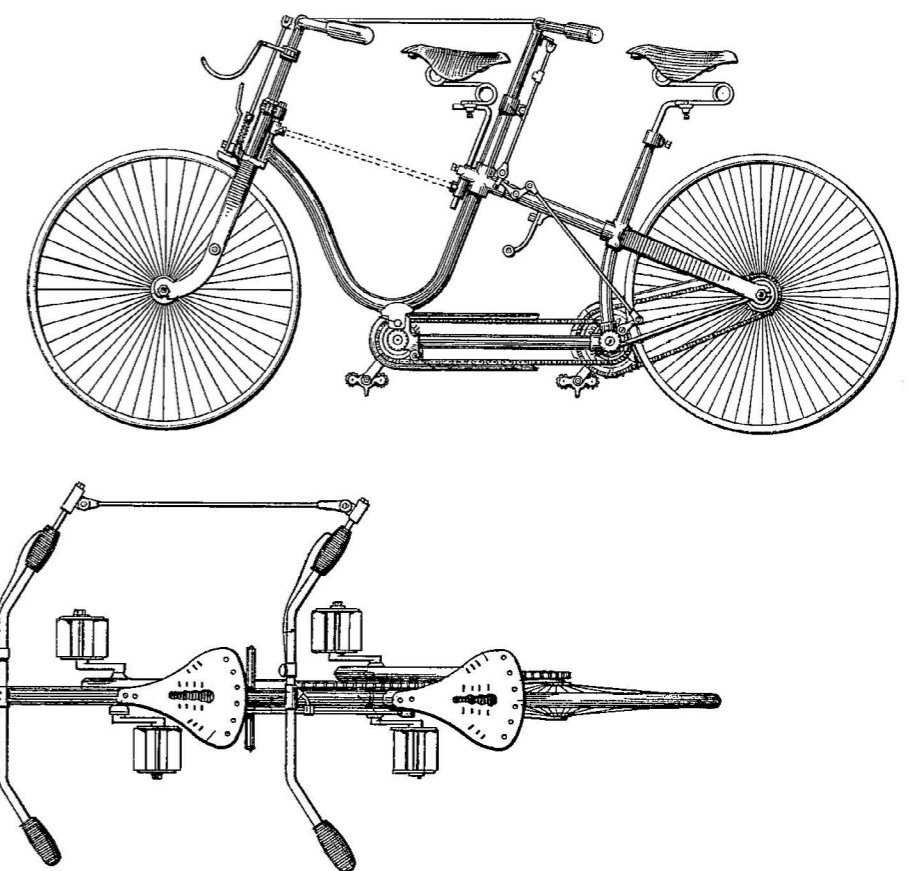


6

### U.S. Patent No. 415072 - Tandem Bicycle

U.S. Patent No. 415072, entitled 'Tandem Bicycle', was issued to creators William Starley of Coventry, England, and Herbert S. Owen of Washington, DC, in November 1889. Patent diagrams show a tandem bicycle assembly similar to the tandem bikes which are still sometimes seen today [24].

Figure 2.9: Tandem Bicycle (US415072A, 1897)



7

### Advancements at the End of 19<sup>th</sup> Century

The pneumatic tyre was first introduced to the bicycle by an Irishman, Dunlop, who was trying to give his young son a more comfortable ride on his tricycle. Soon after, the rear freewheel was developed enabling the rider to drift. This refinement led to the 1890's invention of coaster brakes. Gears and hand-operated wire-pull brakes were also developed during these years, but were only slowly adopted by casual riders [25].

Bicycles even brought about a great social revolution as they enhanced the mobility of women and also allowed the poor to travel greater distances in search of work. By the turn of the century, cycling clubs flourished on both sides of the Atlantic, and touring and racing became widely popular. There were dramatic increases in the speed of racing bicycles as new revolutionary and long-term changes were introduced, such as lightweight steel frames with thin wall tubing [25].



8

**The Roadster - 20<sup>th</sup> Century**

A roadster bicycle is a kind of utility bike once utilized around the world, and still normal in Asia, Africa, Latin America, and a few sections of Europe. Amid the previous couple of decades, styled roadster bikes have regained prevalence in the Western world, especially as a way of life or fashion statement in an urban domain. The ladies' version of the roadster's design was very much in place by the 1890s. It had a step-through frame rather than the diamond frame of the gentlemen's model so that ladies could easily mount and ride their bicycles wearing dresses and skirts. Commonly came with a guard to prevent such clothing becoming entangled in the rear wheel and spokes. As with the gents' roadster, the frame was of steel construction and the positioning of the frame and handlebars gave the rider a very upright riding position. Though they originally came with front spoon-brakes, technological advancements meant that later models were equipped with the much-improved coaster brakes or rod-actuated rim or drum-brakes [26].

**Figure 2.10:** A traditional gents' roadster



**Figure 2.11:** Ladies' roadster of classic design



**2.5.3. Current developments**

Today, lots of innovations in bicycles have evolved such as: index shifting; rear cassettes; increased gearing; aerodynamic wheels, and ceramic bearings. There is electronic gear shifting, where battery powered buttons trigger a solenoid that sends signals to the derailleur. Some cycles also come equipped with power meters that have computerised systems to track the rider's heart rate and power output in watts. Today's bikes are lighter, more efficient, function better and pack a lot more speed. Unlike a car that has a shell covering most of its parts, a bicycle has many components that interact with airflow producing a series of perturbations resulting in drag. For instance, the fork attached to the front wheel throws up a lot of disturbed air. To make cycles more aerodynamic, some designers have significantly reduced drag by hiding the front brake inside the front fork and lowering the rear brake down toward the bottom bracket of the bicycle where the air is already turbulent [27, 28].

Tyre safety and lights for improved rider visibility during the night are featured in a couple of recently issued patents. **U.S. Patent No. 8770808 (2014)**, which is titled 'Bicycle Tail Light', protects an adjustable bicycle light using a light-emitting diode (LED) light source and a versatile mount that can attach to a luggage rack, chain stay or seat post. Assigned to Light & Motion Industries of Marina, CA, the patent's description discusses how the invention is designed to create greater light output and increase the ease of replacing batteries [29]. A method of making bicycle tyres from materials other

than vulcanized rubber is discussed within **U.S. Patent No. 8770243 (2014)**, entitled 'Bicycle Tire'. This patent was assigned to Fine Chemical Company of Korea and it protects the manufacturing of a bicycle tyre composed of foaming, synthetic, resin materials. This construction method is designed to use eco-friendly materials while preventing the tyre from unexpectedly separating from the rim during use. [30]

**U.S. Patent No. 8781690 (2014)**, issued under the title 'Bicycle Seat Position Indicator' and assigned to Shimano Inc. of Osaka, Japan, protects a seat position indicator connected to a controlling device. This indicator sends a signal to the controller regarding the height of the seat relative to the height of the rider and can indicate to the rider that a height adjustment should be made [31]. Finally, a microcomputer and drive assistance electric motor disclosed within **U.S. Patent No. 8781663 (2014)**, titled 'Bicycle Drive Apparatus'. This patent is also assigned to Shimano Inc., and it protects a bicycle with a drive apparatus which has no need for a shift position sensor, simplifying the construction of this vehicle compared to prior models. The bicycle is still powered by pedalling, but the microcomputer issues a shift command to the transmission to shift gears automatically [32].

The design and construction of bicycles has remained largely unchanged over the course of the past century. There is, however, a great deal of innovation still being created by bikemakers across the world. Many of these inventions are related to improvements in comfort and safety for bicycle riders.

### 3.1. Aims and Objectives

The report aims to investigate the trends in patenting activity related to technologies used in the manufacturing of bicycles and their major parts. The study highlights the global scenario of the patenting activity in the bicycle sector and then narrows down trends in five major bicycle producing countries: China, Taiwan, Korea, Japan and India. The first four are the top countries for innovations registered as patents and utility models in this sector, in order of the number of total filings in the last 10 years, i.e. 2007 to 2017.

The combination strategy was selected keeping in view the merits of using IPC and keywords together in the broad field of land vehicles, excluding rails, specified by the class B62, in general, and then selecting the inventions related to mechanically driven cycles, in particular. IPCs are used by the majority of patent jurisdictions to classify technologies and are regarded as the best tool to get results for non-English speaking countries. The keywords helped in targeting bicycle-related technologies for a better analysis. The corresponding Cooperative Patent Classification (CPC) was also referred to to supplement IPC search results.

### 3.2. Strategy

Patents related to different technologies involved in manufacturing a mechanically driven cycle and its parts were searched based on a combined strategy that used International Patent Classification (IPC) codes along with the selected keywords. This strategy was used to retrieve information on granted patents and patent applications that were published in the last 10 years, 2007-2017, relating to the bicycle sector; the Derwent Innovation database was used that has patent data from 50 patent issuing authorities and 2 journal sources, i.e. data from over 80 countries.

Initially IPC definitions searched for terms which specifically cover any subject matter within the scope of the report. The IPC class B62 'Land vehicles for travelling otherwise than on rails' was identified and subclasses within it were further scrutinized to identify technological fields concerned with mechanically driven bicycles, unicycles or tricycle. The 5 IPC subclasses B62H, B62J, B62K, B62L and B62M were finalised to carry out the present study based on their relevance to the scope of present analysis. The descriptions of all the subclasses belonging to the class B62 are provided in Table 3.1.



**Table 3.1:** Description of subclasses belonging to IPC/CPC class B62

IPC code	Description
B62B	Hand-propelled vehicles, e.g. hand carts or perambulators; sledges
B62C	Vehicles drawn by animals
B62D	Vehicles; trailers
B62H	Cycle stands; supports or holders for parking or storing cycles; appliances preventing or indicating unauthorised use or theft of cycles; locks integral with cycles; devices for learning to ride cycles
B62J	Cycle saddles or seats; accessories peculiar to cycles and not otherwise provided for, e.g. article carriers or cycle protectors
B62K	Cycles; cycle frames; cycle steering devices; rider-operated terminal controls specially adapted for cycles; cycle axle suspensions; cycle sidecars, forecars, or the like
B62L	Brakes specially adapted for cycles
B62M	Rider propulsion of wheeled vehicles or sledges; powered propulsion of sledges or cycles; transmissions specially adapted for such vehicles

The analysis was carried out based on the International Patent Documents (INPADOC) family records for a particular trend. This was aimed to study the patent records base available in the particular technology class. The INPADOC family is a set of all patent documents filed by the assignee in different countries for the same technology/invention. The analysis of the data and charts prepared for the illustration of trends in this report has been based on the INPADOC families retrieved to avoid duplication of results for technologies originating in a particular country and simultaneously being protected in many other countries.

The corresponding CPC class was found to be B62 and the subclasses, groups and subgroups within the class B62 were found to be the same in both IPC and CPC classification. Another IPC/CPC class that was identified to be relevant was the subgroup E05B that includes patents for technologies related to bicycle locks.

Keywords were used selectively to build up a search strategy so as to include all mechanically driven cycles such as ‘unicycle’,

‘bicycle’ and ‘tricycle’ but with an exclusion of ‘hand carts’, ‘animal driven vehicles’, ‘battery operated bikes’, ‘solar and e-bikes’ and all other motorized two wheelers and vehicles. Thus a combination strategy with IPC and keywords along with a limitation of being published in the last 10 years, i.e. from 2007-2017, was used to fetch data from the Derwent Innovation database and the Indian Patent Office’s INPASS database (for patents filed in India). Representative examples of 30 patent documents belonging to different categories of technology are provided in the annexure along with their abstracts.

### 3.3. Overview of Bicycle-Related Patents Published Worldwide

In the last 10 years, a total of 53,941 patent/utility model applications/granted patents were published by various patent issuing jurisdictions around the world for technologies related to bicycles and their parts. Furthermore, it was observed that out of the total 53,941 patent applications published,

approximately half (27,563) INPADOC families were reported. This clearly highlights the potential of bicycle technologies in alternate markets in view of the open global market regime and the high demand for improved bicycles due to better road connectivity, growing health consciousness, shrinking parking spaces, etc. The top 15 countries were plotted for patent publications to find the most innovative countries in this technology sector (Figure 3.1). The four leading countries from the sector are: China, that has the most publications in the bicycle sector with 16785 INPADOC patent records, followed by Taiwan with 4990, the USA with 3279, and Korea with 2562.

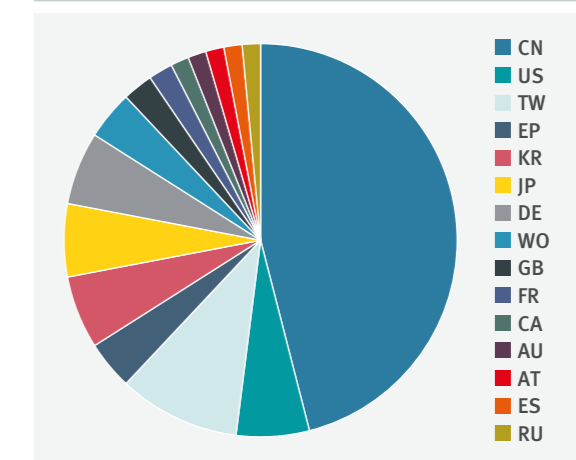
It is also interesting to note that out of the 53,941 patent records in the last 10 years, 13171 were granted patents in different jurisdictions, 15147 were utility models while 25623 patent applications were processed at different legal stages (Figure 3.2). The number of utility patents is significantly high in the bicycle sector owing to the small improvements being developed in bicycles related to ease of handling, comfort and control of the machine. The most innovative countries in this field of technology, namely China, Taiwan, Japan, and Korea, all provide utility model protection in their jurisdictions which equates to a significant number of total patent applications filed for bicycle-related inventions.

A closer analysis of the global publication trend over the last ten years also indicates the growth of innovations in the sector. The curve consistently rises from 2474 patent publications in 2007, which approximately doubled to 4131 publications in 2015 (Figure 3.3). This rise is also justified by the recent growth of the fitness/ exercise equipment sector as well as racing cycles.

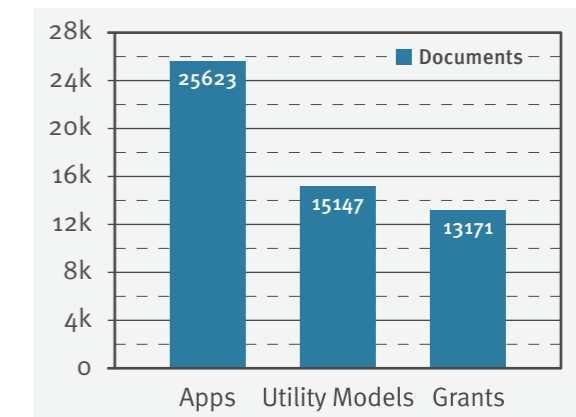
Furthermore, Shimano KK, Japan, Taicang Chezhongbao Leisure AR, China and Campagnolo SRL, Italy emerged as the global leaders in the applicant category with 941,

152 and 125 patent families respectively. The number of actual patent records held by these companies in various countries is far more exhaustive and out of the scope of this study due to the limitations of the Derwent Innovation database. However, the basic technologies developed or protected by these companies are actually reflected in the numbers mentioned above. Shimano KK, Japan is far ahead of its counterparts in the industry and has been consistently filing for technologies for bicycle hand actuating gear mechanisms, levers and brake actuating mechanisms, thus capturing the mountain bikes domain (Figure 3.4).

**Figure 3.1:** Top 15 countries for innovations in the bicycle sector

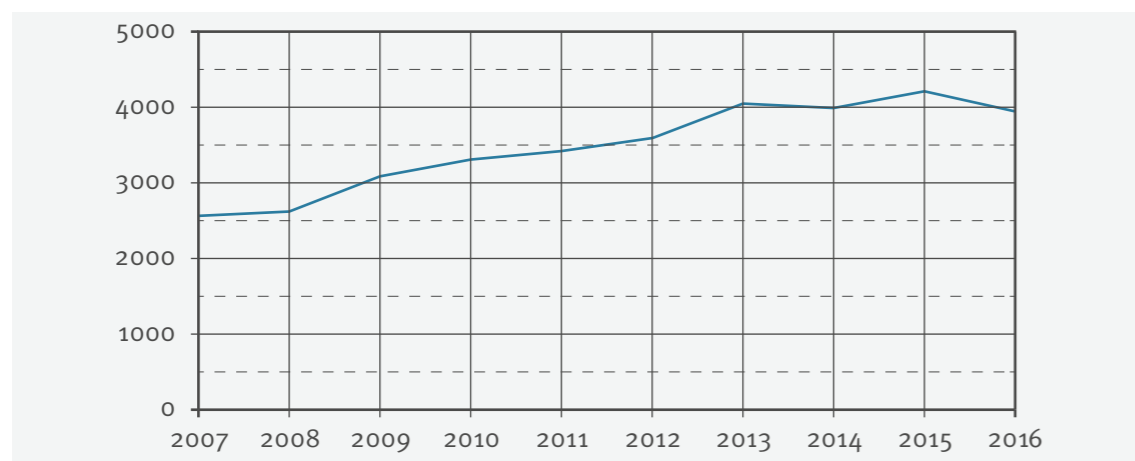


**Figure 3.2:** Distribution of global patent records in the bicycle sector w.r.t their legal status

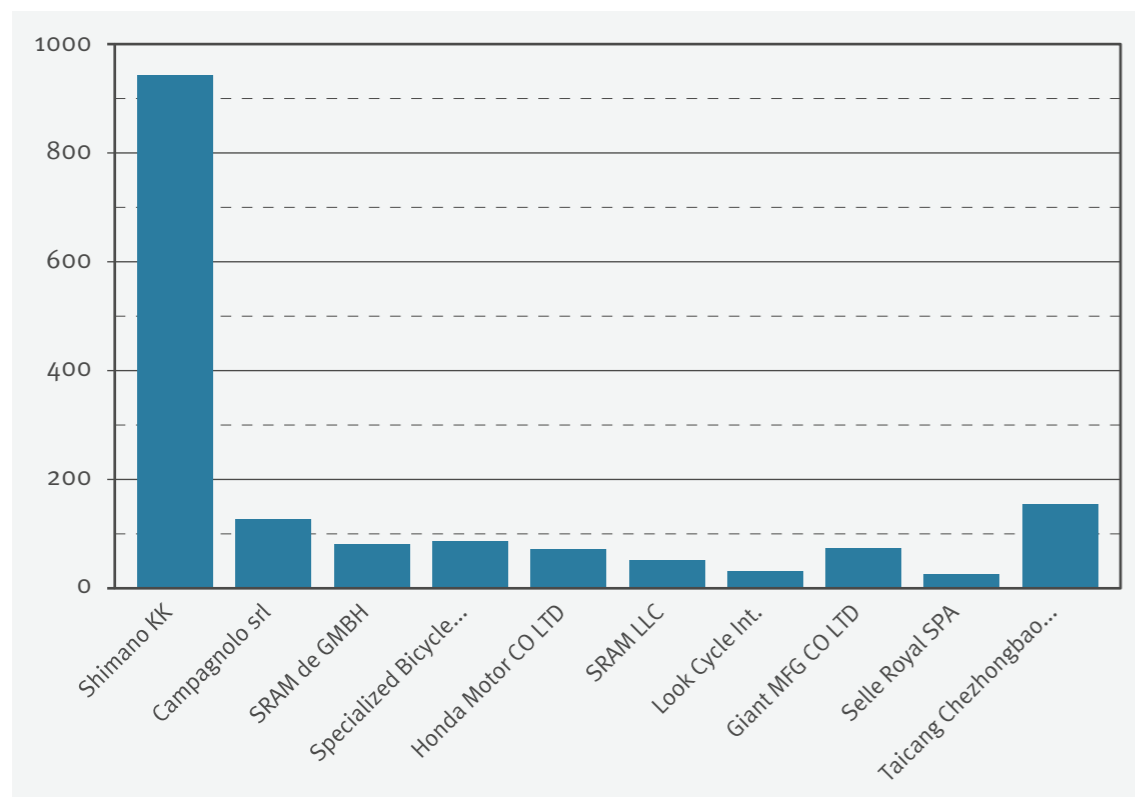




**Figure 3.3:** Year wise distribution of patent documents in the last 10 years



**Figure 3.4:** Top 10 global applicant/assignees for technologies in the bicycle sector



Source for all graphics in this and previous pages: Derwent Innovation ([www.derwentinnovation.com](http://www.derwentinnovation.com))

Analysis of the patents published in the last 10 years vis-à-vis technologies they are associated with, revealed that most applications have been filed for technologies related to collapsible or foldable cycles followed by cycle saddles, frames and seat

pillars. A list of the top 15 IPCs of the worldwide patent records in the last decade, the document count in each class, and a brief clarification of each subclass is provided in Table 3.2 below.

**Table 3.2:** Top 15 IPC subclasses for bicycle-related technologies published worldwide in the last 10 years

Current IPC	Technology	Document count	Percentage
B62K 15/00	Collapsible or foldable cycles	2648	20.14%
B62M 25/04	Actuators for gearing speed-change mechanisms specially adapted for cycles	466	3.50%
B62J 99/00	Subject matter not provided for in other groups of this subclass	922	6.92%
B62M 3/00	Construction of cranks operated by hand or foot	897	6.73%
B62J 1/00	Saddles or other seats for cycles; arrangement thereof; component parts	1084	8.13%
B62J 1/08	Frames for saddles; connections between saddle frames and seat pillars; seat pillars	1097	8.23%
B62L 3/02	Brake-actuating mechanisms controlled by hand levers	710	5.33%
B62M 3/08	Pedals	895	6.71%
B62J 11/00	Supporting devices for attaching articles of definite shape to cycles, e.g. for maps, umbrellas, bottles	1072	8.04%
B62M 1/36	Rider propulsion of wheeled vehicles with rotary cranks, e.g. with pedal cranks	563	4.22%
B62K 9/00	Children's cycles	976	7.32%
B62K 23/06	Cycle levers	312	2.34%
B62M 25/08	Actuators for gearing speed-change mechanisms specially adapted for cycles with electrical or fluid transmitting systems	240	1.80%
B62K 21/12	Handlebars; handlebar stems	685	5.14%
B62K 3/00	Bicycles	726	5.45%

Source: Derwent Innovation



### 3.4. Country Wise Trends for Bicycle Patents

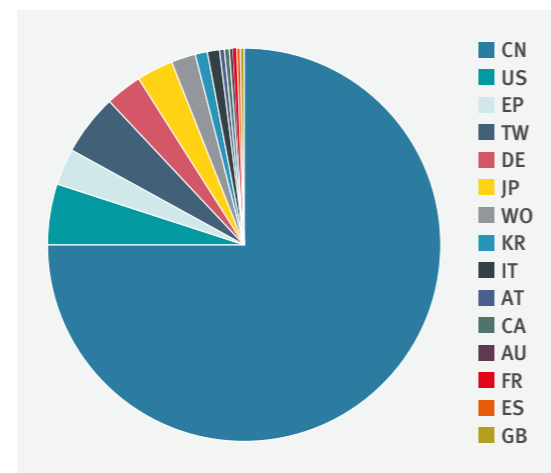
#### 3.4.1. China

Figure 3.5 highlights that approximately 75% of the total patent documents filed in China were by done so by Chinese nationals. The USA emerged as the second largest player, in terms of patent publications in China, with 1162 documents, followed by Taiwan with 994 documents. The top 3 players are the same worldwide and in China signifying the importance of the Chinese market due to its huge manufacturing potential for the bicycle industry.

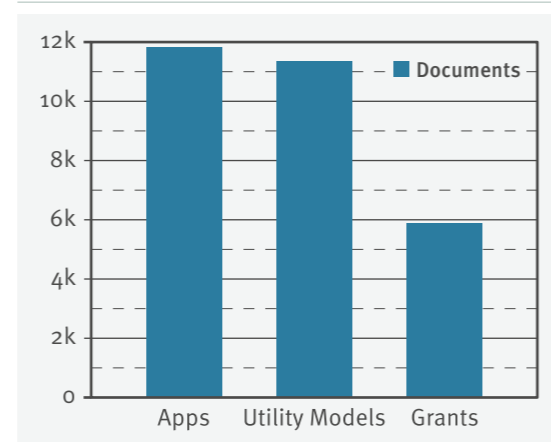
It is interesting to note that almost equal numbers of patent applications and utility model publications (around 11,000) were reported in the last 10 years in China against the 5879 patents granted (Figure 3.6).

Among the top assignees of the patents in China, Shimano KK, Japan held 611 patent family records, Taicang Chezhongbao Leisure AR, China held 152 INPADOC patent records and Pang Mingfang, China held 138 patent family records. Other major applicants included subsidiaries of Shimano, namely Shimano Inc., Shimano Corp., and Campagnolo SPA.

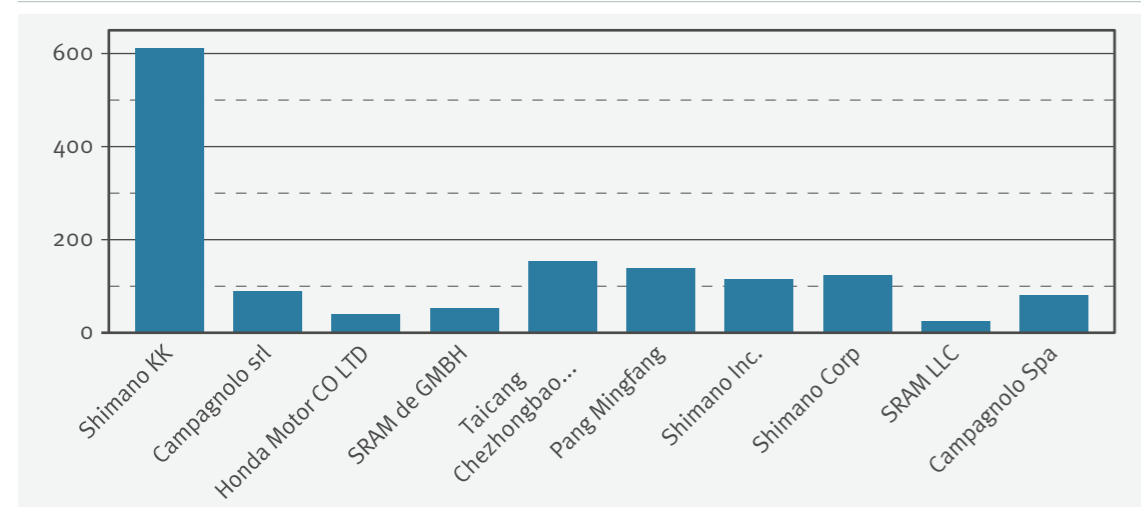
**Figure 3.5:** Top 15 country applicants filing patents for bicycle technologies in China



**Figure 3.6:** Distribution of patent records in the bicycle sector in China w.r.t their legal status



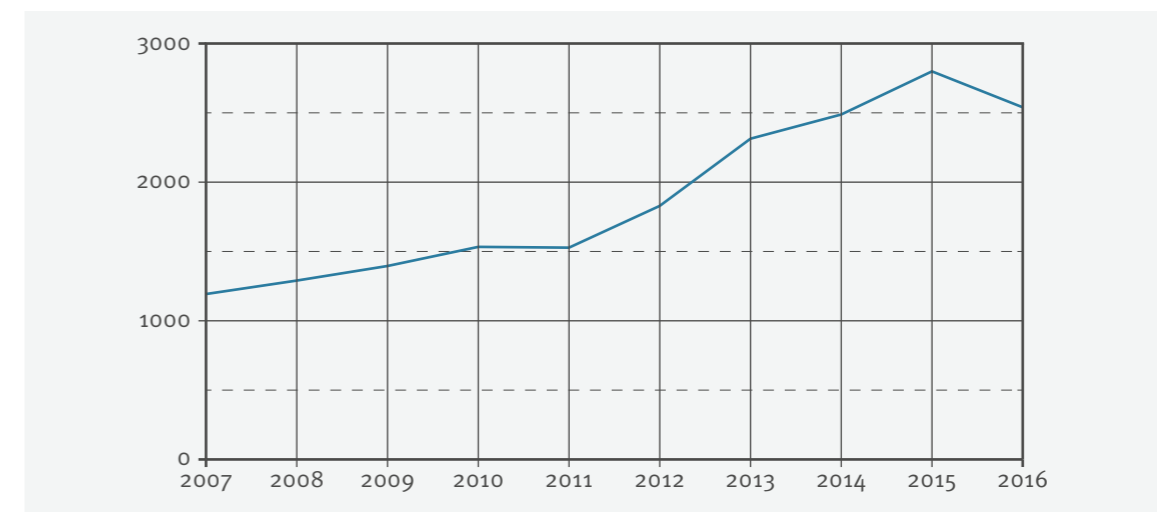
**Figure 3.7:** Top 10 assignees for patents published in China for bicycle technologies in the last 10 years



The year wise publication distribution highlighted an increase in the number of patent documents filed from 1196 in 2007, to 1528 documents in 2011, rising steeply to 2804 documents in 2015 (Figure 3.8).

The surge of technologies filed in China were in the field of collapsible or foldable cycles (IPC B62K 15/00), cycle saddles (B62J 1/00) and support devices for attaching devices to bicycles (B62J 11/00). Other major fields of technology are reflected in Table 3.3 below.

**Figure 3.8:** Year wise distribution of patent documents in China in the last 10 years



**Table 3.3:** Top 15 IPC subclasses for bicycle-related technologies published in China

Current IPC	Description of technology	Document count	Percentage
B62K 15/00	Collapsible or foldable cycles	2047	23.83%
B62M 25/04	Actuators for gearing speed-change mechanisms special for cycles	300	3.49%
B62J 99/00	Subject matter not provided for in other groups of this subclass	440	5.12%
B62J 1/00	Saddles or other seats for cycles; Arrangement thereof; component parts	636	7.40%
B62L 3/02	Brake-actuating mechanisms for control by a hand lever	441	5.13%
B62J 11/00	Supporting devices for attaching articles of definite shape to cycles, e.g. for maps, umbrellas, bottles	635	7.39%
B62M 3/00	Construction of cranks operated by hand or foot	402	4.68%
B62J 1/08	Frames for saddles; connections between saddle frames and seat pillars; seat pillars	575	6.69%
B62J 9/00	Panniers, saddle bags, or other containers specially adapted to be attached to cycles	625	7.28%
B62M 03/08	Pedals	444	5.17%
B62M 1/24	Rider propulsion of wheeled vehicles with with reciprocating levers, e.g. foot levers	474	5.52%
B62K 3/00	Bicycles	466	5.42%
B62M 1/36	Rider propulsion of wheeled vehicles with rotary cranks, e.g. with pedal cranks	269	3.13%
B62K 19/00	Cycle Frames	440	5.12%
B62J 6/00	Arrangement of optical signalling or lighting devices on cycles, the mounting or supporting thereof or circuits thereof	397	4.62%

Source for table and all graphics in this and previous pages: Derwent Innovation ([www.derwentinnovation.com](http://www.derwentinnovation.com))





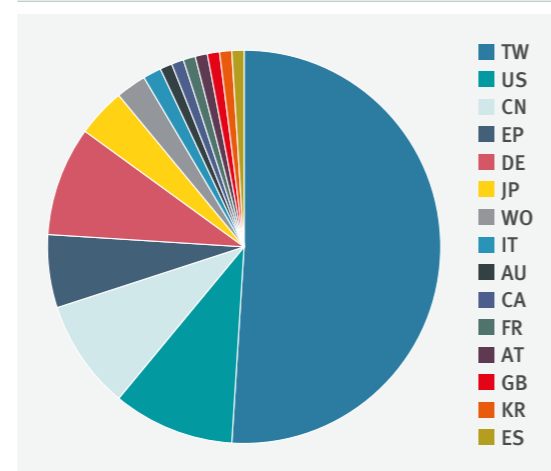
### 3.4.2. Taiwan

Around 60% of the patent documents filed in Taiwan were by Taiwanese nationals, as shown in Figure 3.9. As in China, similar trends were observed with the USA being the second largest contributor of patent publications in Taiwan with 1082 documents, followed by China with 878 documents. These figures are again suggestive of the strong competition between China and the USA in terms of patenting activity in the bicycle sector. Interestingly, Germany emerged as the fourth largest player, followed by the European Union in terms of patent publications in Taiwan.

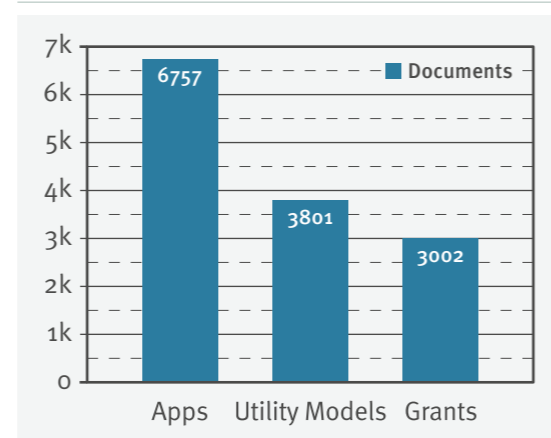
In Taiwan, the numbers of patent applications filed in the last ten years is approximately double, 6757, that of utility model publications, 3801, and granted patents, 3002, as shown in Figure 3.10. This is a strong indicator of patenting activities in Taiwan increasing in the last 10 years with a lot of applications still awaiting the decision from the authorities on the grant of patents.

Among the top assignees of the patents in Taiwan, Shimano KK, Japan along with its subsidiary Shimano Inc., are the front runners with 573 and 126 patent family records respectively. Campagnolo SRL held 84 patent family records, followed by JD Components Co. Ltd., and Specialized Bicycle Components.

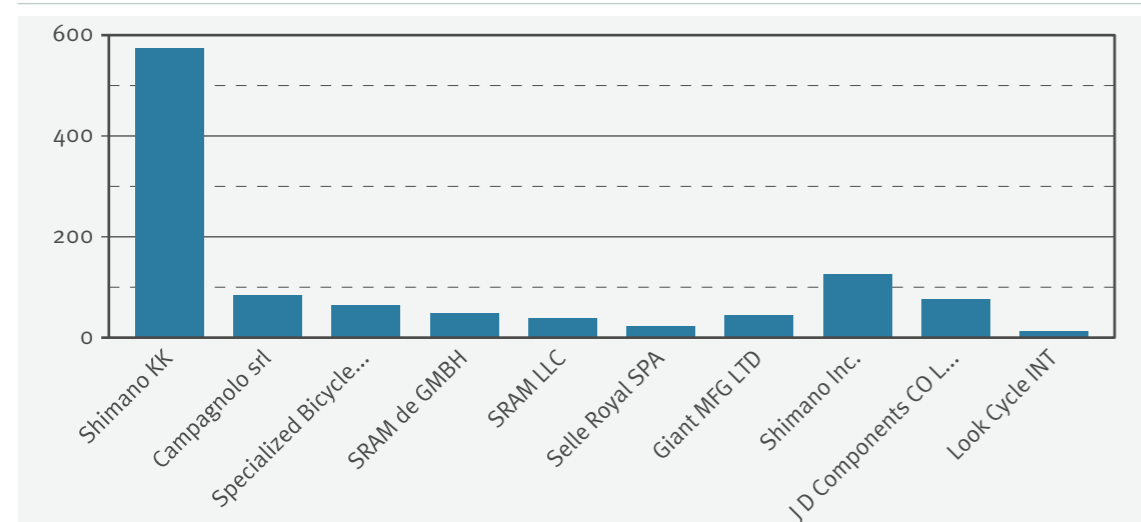
**Figure 3.9:** Top 15 country applicants filing patents for bicycle technologies in Taiwan



**Figure 3.10:** Distribution of patent records in the bicycle sector in Taiwan w.r.t their legal status



**Figure 3.11:** Top 10 assignees for patents published in Taiwan for bicycle technologies in the last 10 years

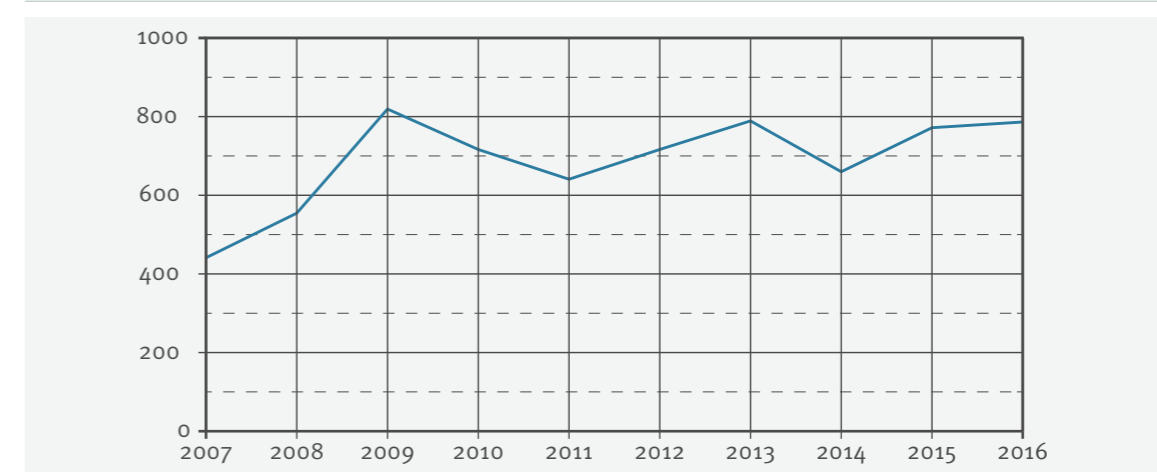


The year wise publication distribution, highlighted in Figure 3.12 below, shows peaks in patenting activity in 2009, 2013 and 2016. However, numbers have risen from 428 documents filed in 2007 to 790 in 2009, and 775 in 2016.

connections between saddle frames and seat pillars (IPC B62K 1/08) with 10.22% of the total documents; hand levers for control of cycles (B62L 3/02 or B62K 23/06) with 9.28% of the total documents, and for collapsible or foldable cycles (IPC B62K 15/00) with 8.58% of the total documents. Other major fields are listed in Table 3.4 below.

The major fields of bicycle technology filed in Taiwan were in: frames for saddles and

**Figure 3.12:** Year wise distribution of patent documents in Taiwan in the last 10 years



**Table 3.4:** Top 15 IPC subclasses for bicycle-related technologies published in Taiwan

Current IPC	Description of technology	Document count	Percentage
B62M 25/04	Actuators for gearing speed-change mechanisms specially adapted for cycles	204	8.34%
B62L 3/02	Brake-actuating mechanisms for control by a hand lever	227	9.28%
B62M 3/00	Construction of cranks operated by hand or foot	193	7.89%
B62K 23/06	Levers	176	7.19%
B62M 9/10	Transmissions characterized by use of an endless chain, belt, or the like involving different-sized wheels selectively engaged by the chain, belt, or the like	133	5.44%
B62J 1/08	Frames for saddles; connections between saddle frames and seat pillars; seat pillars	250	10.22%
B62K 15/00	Collapsible or foldable cycles	210	8.58%
B62M 1/36	Rider propulsion of wheeled vehicles with rotary cranks	84	3.43%
B62M 25/08	Actuators for gearing speed-change mechanisms specially adapted for cycles with electrical or fluid transmitting systems	141	5.76%
B62M 03/08	Pedals	184	7.52%
B62J 99/00	Subject matter not provided for in other subgroups of this subclass	132	5.39%
B62J 1/00	Saddles or other seats for cycles; Arrangement thereof; component parts	116	4.74%
B62K 23/02	Hand-actuated rider-operated controls specially adapted for cycles	160	6.54%
F16H 55/30	Chain wheels (specially adapted for cycles B62M)	92	3.76%
B62M 9/00	Transmissions characterized by use of an endless chain, belt, or the like	145	5.93%

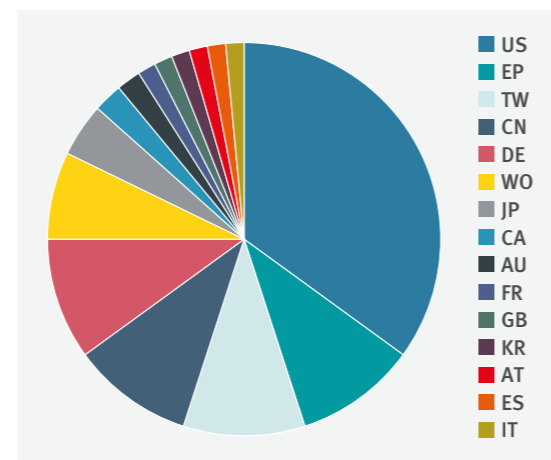
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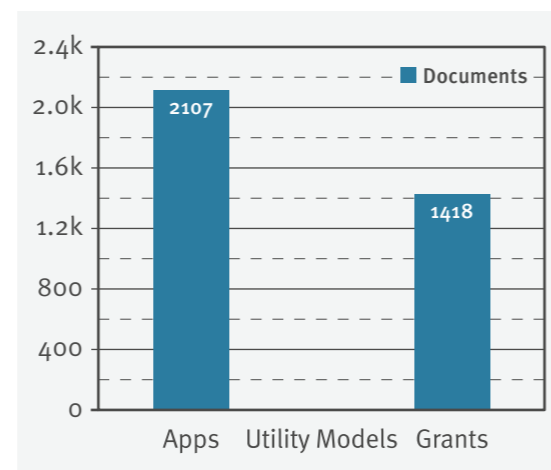
### 3.4.3. United States of America

The USA is one of the most important and busiest patent issuing authorities in the world and hence very valuable from the perspective of studying the global patenting trends. In the bicycle sector it is the top non-Asian and third largest player worldwide, as Figure 3.13 highlights. After the USA, which is the top applicant in its own country with a 38% share, Taiwan emerges as a major country with 757 applications, followed closely by the European Union and China with 716 and 687 applications filed with USPTO respectively. Germany, which is a major automobile manufacturer, closely followed China with 602 patent applications in the bicycle sector. The country wise distribution of patent applications received by USPTO in the last decade is presented in Figure 3.13.

**Figure 3.13:** Top 15 country applicants filing patents for bicycle technologies in the USA



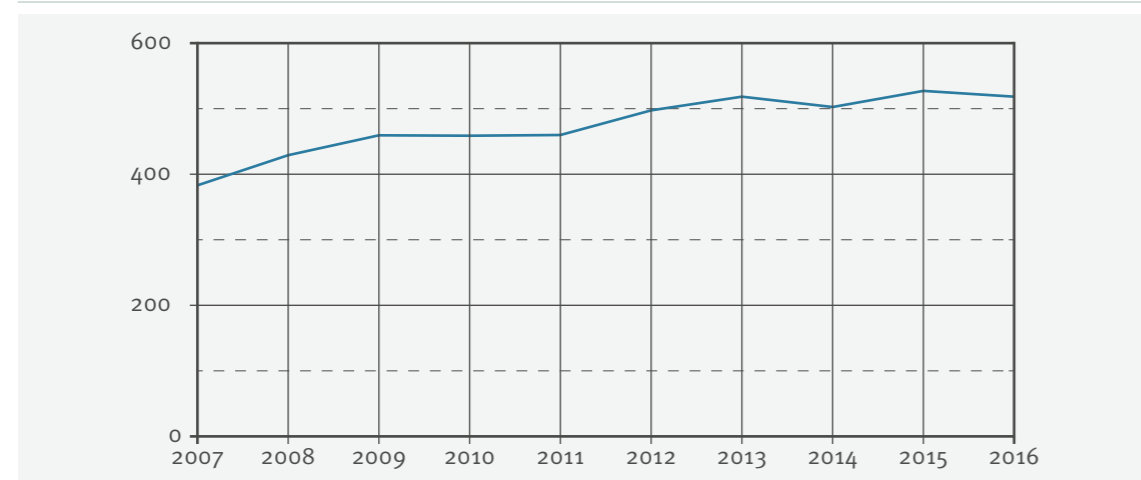
**Figure 3.14:** Distribution of patent records in the bicycle sector in the USA w.r.t their legal status



As the USA does not grant utility model protection, the total patent records were segregated on the basis of publication and grant. The number of patent applications published during the last decade in the USA was 2107, in various stages of processing, while 1418 have been granted (Figure 3.14).

As expected, the trend of patent publications for bicycle and bicycle-related technologies has been on the rise in the last 10 years. The published patent applications reached 382 in 2007, steadily rising to 519 in 2013, before maintaining the same trajectory in 2016 with a slight dip in 2014 (Figure 3.15).

**Figure 3.15:** Year wise distribution of patent documents in the USA in the last 10 years

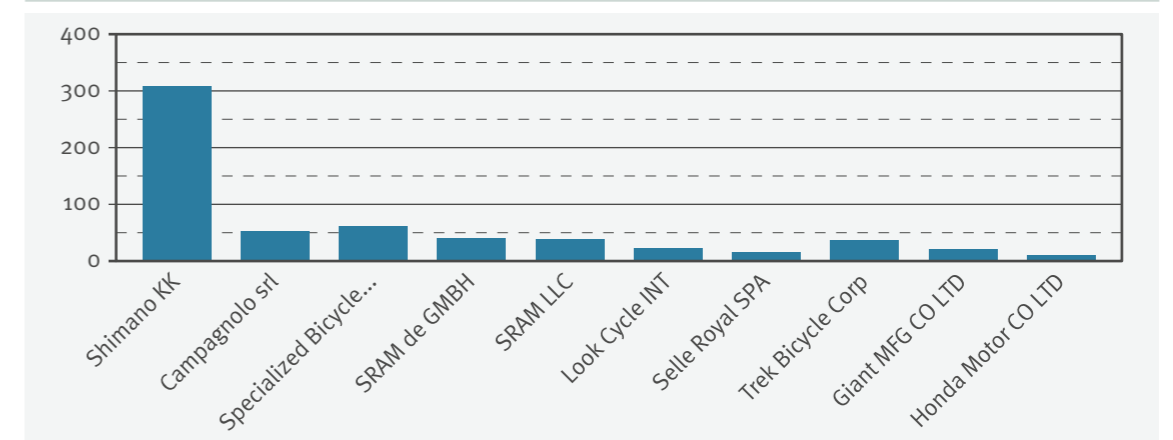


Shimano KK is the leading applicant for bicycle-related patents filed in the USA with 308 family patents. Other prominent assignees of bicycle patents include: Specialized Bicycle Components with 60 patent families; Campagnolo SRL with 51; SRAM DE GMBH with 40; SRAM LLC with 38, and TREK Bicycle Corp. with 36 patent families (Figure 3.16).

sector varied from the common trends in other major countries. The top three fields during the study period in the USA were: construction of cranks operated by hand or foot that convert reciprocal motion generated by pedalling to circular motion; saddles or other seats for cycles, and bicycle frames (Table 3.5). Furthermore, collapsible cycles, which dominated patent activity in other jurisdictions, was only 3.96% in the USA.

It was observed that the main technology area of patents filed in the USA in the bicycle

**Figure 3.16:** Top 10 assignees for patents published in the USA for bicycle technologies in the last 10 years



**Table 3.5:** Top 15 IPC subclasses for bicycle-related technologies published in the USA

Current IPC	Description of technology	Document count	Percentage
B62M 3/00	Construction of cranks operated by hand or foot	177	9.74%
B62M 25/04	Actuators for gearing speed-change mechanisms specially adapted for cycles	123	6.77%
B62M 03/08	Pedals	140	7.71%
B62M 1/36	Rider propulsion of wheeled vehicles with rotary cranks	123	6.77%
B62L 3/02	Brake-actuating mechanisms for control by a hand lever	144	7.93%
B62J 1/00	Saddles or other seats for cycles; arrangement thereof; component parts	169	9.30%
B62M 9/10	Transmissions characterized by use of an endless chain, belt, or the like involving different-sized wheels selectively engaged by the chain, belt, or the like	112	6.16%
B62J 1/08	Frames for saddles; connections between saddle frames and seat pillars; seat pillars	159	8.75%
B62K 23/06	Levers	120	6.60%
G05G 1/30	Foot actuated controlling members	40	2.20%
B62K 15/00	Collapsible or foldable cycles	72	3.96%
B62K 21/12	Handlebars; handlebar stems	124	6.82%
B62K 3/02	Bicycle Frames	161	8.86%
B62K 25/02	Axle suspension for mounting axles rigidly on cycle frame or fork, e.g. adjustably	74	4.07%
B62K 19/36	Cycle frames for attaching saddle pillars, e.g. adjustable during ride	79	4.35%

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### 3.4.4. Korea

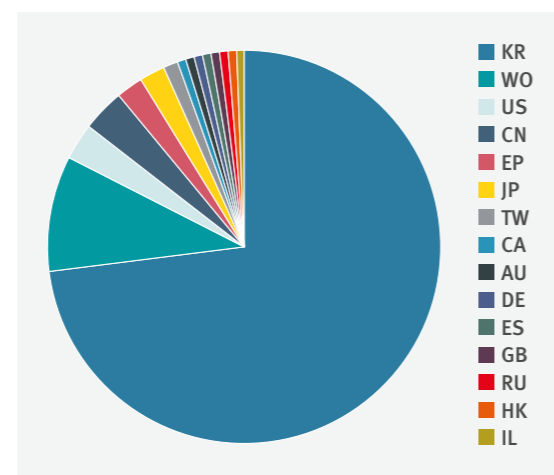
Korean applicants dominate patent filing in the bicycle sector in their country with almost 74% share, as depicted in Figure 3.17. Among the foreign applicants, PCT applications represent the highest share with 282 documents, followed by competitive numbers from China and the USA at 129 and 125 documents respectively.

Like Taiwan, in Korea the number of patent applications for bicycle technologies is approximately twice the number of the granted patents in the last 10 years. However, the number of utility models is much lower at 413 records (Figure 3.18).

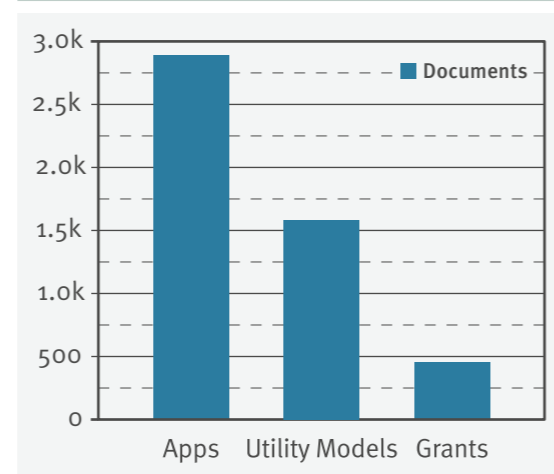
The publication trend in Korea has witnessed a decline since 2011. The number of publications has reduced by a half in the last six years, from 500 records in 2011 to 223 records in 2017, as depicted in Figure 3.19.

In Korea, Kwon Hyeok Suk, Mando Corp., and Choi Jin Man emerged as the top three applicants for patent filing related to bicycle technologies, possessing 21, 19 and 15 family patents respectively. Other close competitors include CHOI In Sup, IG Cardboard Technologies, and Bettin Karsten (Figure 3.20). It is interesting to note the absence of Shimano KK, Japan in the Korean bicycle market which is the leader in almost all other major country players.

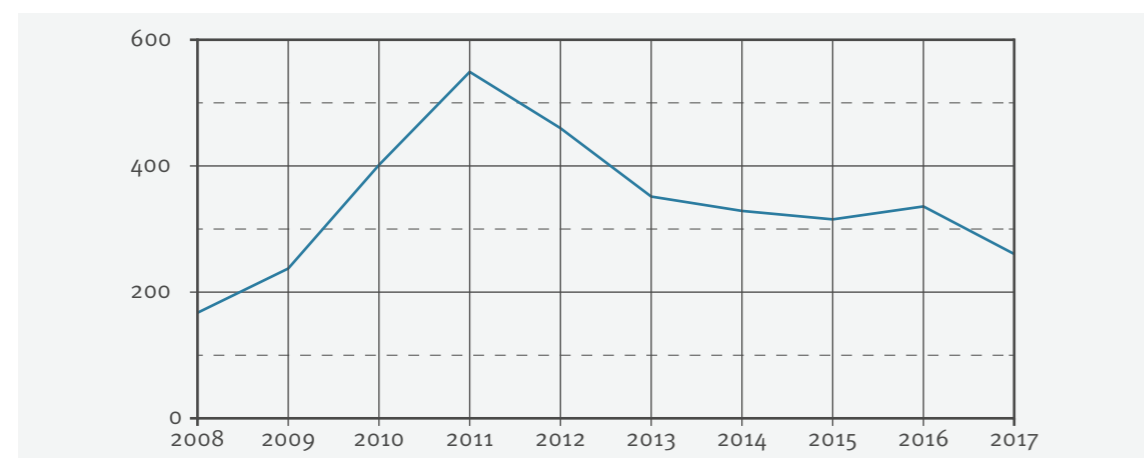
**Figure 3.17:** Top 15 country applicants filing patents for bicycle technologies in Korea



**Figure 3.18:** Distribution of patent records in the bicycle sector in Korea w.r.t their legal status



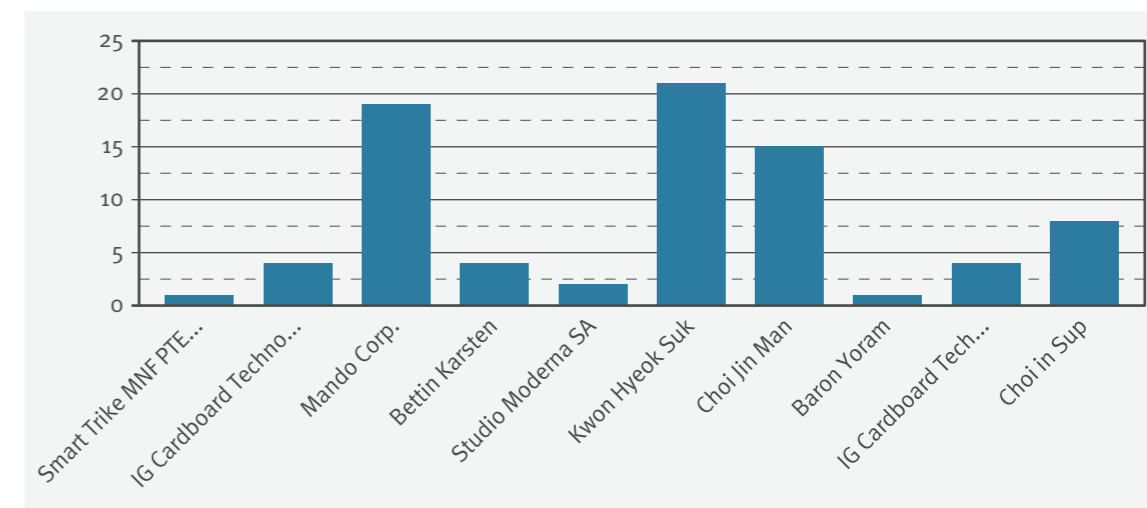
**Figure 3.19:** Year wise distribution of patent documents in Korea in the last 10 years



Most patent documents published during the study time were from the technology areas of: supports for parking or storing cycles codified by subclass B62H 3/00; collapsible

or foldable cycles codified by subclass B62K 15/00, and forked supports for holding the wheel during parking codified by subclass B62H 3/04, as listed in Table 3.6 below.

**Figure 3.20:** Top 10 assignees for patents published in Korea for bicycle technologies in the last 10 years



**Table 3.6:** Top 15 IPC subclasses for bicycle-related technologies published in Korea

Current IPC	Description of technology	Document count	Percentage
B62K 15/00	Collapsible or foldable cycles	196	10.03%
B62H 3/00	Separate supports or holders for parking or storing cycles	231	11.82%
B62K 17/00	Convertible cycles not otherwise provided for	166	8.50%
B62J 99/00	Subject matter not provided for in other groups of B62J	177	9.06%
B62H 3/04	Separate supports or holders for parking or storing cycles involving forked supports or brackets for holding a wheel	186	9.52%
B62M 3/00	Construction of cranks operated by hand or foot	135	6.91%
B62J 1/08	Frames for saddles; connections between saddle frames and seat pillars; seat pillars	115	5.89%
B62J 1/00	Saddles or other seats for cycles; arrangement thereof	74	3.79%
B62M 03/08	Pedals	107	5.48%
B62H 03/08	Separate supports or holders for parking or storing cycles separate supports or holders for parking or storing cycles	129	6.60%
B62H 5/00	Appliances preventing or indicating unauthorised use or theft of cycles; locks integral with cycles	125	6.40%
B62M 1/36	Rider propulsion of wheeled vehicles with rotary cranks	74	3.79%
B62M 1/24	Rider propulsion of wheeled vehicles with reciprocating levers, e.g. foot levers	99	5.07%
B62J 1/02	Saddles resiliently mounted on the frame; equipment thereof, e.g. springs	97	4.96%
B62K 9/02	Tricycles	43	2.20%

Source for table and all graphics in this and previous pages: Derwent Innovation ([www.derwentinnovation.com](http://www.derwentinnovation.com))



### 3.4.5. Indian Scenario

The INPASS database was selected to retrieve information regarding filed and granted patents as it provides comprehensive information of the IP filings in India, which is comparatively lacking in the Derwent Innovation database.

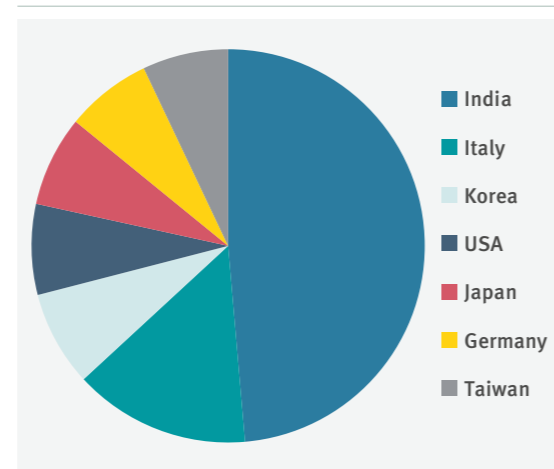
The patent search in the INPASS database gave 321 results for patent applications and 76 results for granted patents that were published for technologies related to the bicycle sector in the last 10 years. Both these result sets were thoroughly analysed.

The trend of patent applications published for bicycle-related inventions in India in the last 10 years showed a peak in activity in 2016, wherein 76 applications were published, out of which 33 were filed by Indian nationals and 43 were by foreign applicants (Figure 3.21). The overall distribution showed no specific trend.

The country wise distribution of patents applications revealed that Indian nationals filed the most patents in this sector with 124 applications, followed by Italy with 37 pending patent applications at the Indian Patent Office. Other prominent players were: Korea with 20 applications; the USA and Japan with 19; Germany and Taiwan with 18;

France with 17, and China with 12 (Figure 3.22). It is interesting to note that most of the Indian patent applications were filed by individuals whereas those filed by foreign entities were mainly from industry. Only 5 patent applications were filed by Indian academic institutions during the reporting period.

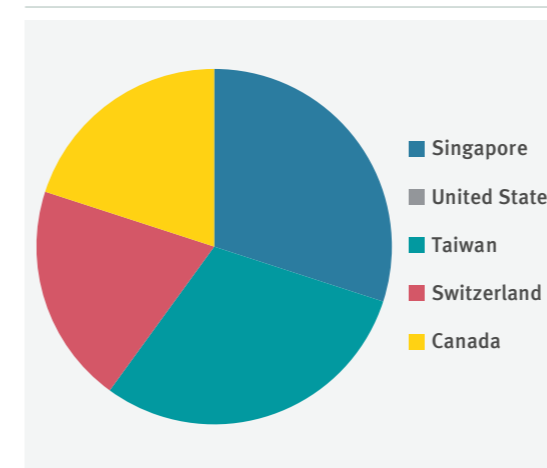
**Figure 3.22:** Top countries for patent applications filed in India in the last 10 years in the bicycle sector



The scenario for granted applications differed from others in the bicycle sector, as the highest number of patents were granted for Japan (41). These granted patents belonged to two applicants, namely Shimano Inc., Japan with 25 grants for their applications

and Honda Giken Kogyo Kabushiki Kaisha with 16 grants. The second country, in terms of highest granted patents, was India itself with 14 grants in the last 10 years (Figure 3.23). Other countries had much fewer or negligible numbers.

**Figure 3.23:** Top countries for granted patents in India in the last 10 years in the bicycle sector



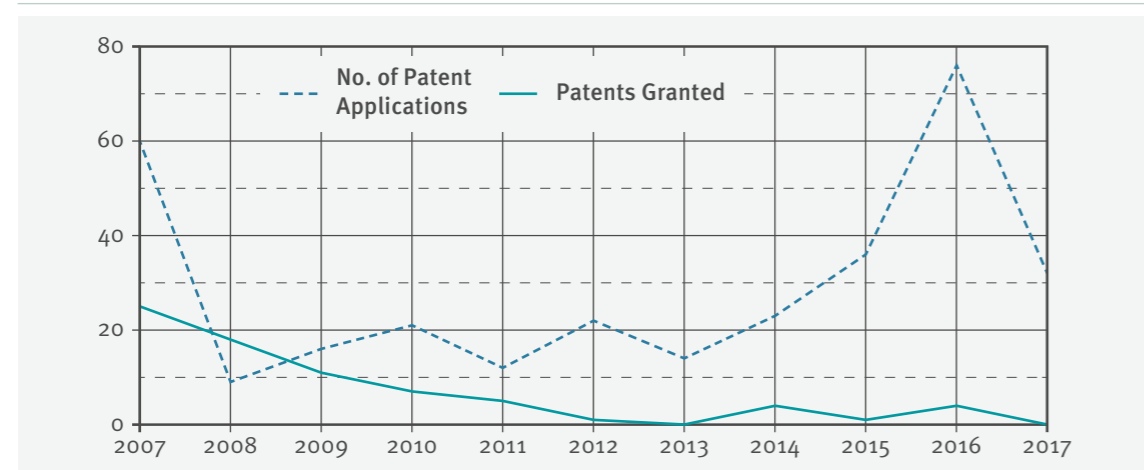
The top foreign applicants that filed for bicycle-related technologies in India were Shimano Inc., Japan (37); Campagnolo SRL, Italy (20); Honda Giken Kogyo Kabushiki Kaisha, Japan (16); M. D'a. Francesco Riondato, Italy (9), and Michelin Recherche Et Technique S.A, France (7).

technological domain by China in this sector and its dominance in the manufacturing sector. In contrast, the number of patent filings in the USA suggests its emergence as a second leading player in the bicycle sector.

Over the years, the R&D focus in the sector has changed from basic frames to need-based technologies like foldable cycles, geared bikes and improvements in cycle saddles. These have emerged due to a shortage of parking spaces, a rise in the demand for exercise and recreation equipment, and enhanced comfort during their usage. Shimano KK, Japan has been the global leader in mountain bike technology, possessing the most patent holdings, while Campagnolo, Italy has captured the road cycling and track cycling sectors.

Despite India having a strong manufacturing base for bicycle components, especially in Ludhiana, Punjab, the number of patent filings in India is minimal compared to other jurisdictions. This may be due to the lack of utility model protection in India, which prevails in most of the other top countries reported. MSMEs, generally, opt out of patenting their minor improvements, which could be due to stricter requirements for patents compared to utility models. The low numbers of patents may also be attributed to low R&D inputs in this sector, both by industry and academic institutions. Parallel to other top applicants worldwide, the Indian bicycle industry particularly needs to focus on geared and collapsible bicycles to capture the high-end bicycle market which has a huge potential in the developing countries. To date, only 5 patent applications have been filed by academic institutions. These institutions, especially engineering institutions, need to take up research projects in collaboration with industry partners to generate need-based improvements in the bicycle technology sector that result in protectable IP in the form of patents and industrial designs. This industry-institute partnership will not only lead to strengthening of India's IP portfolio but will also result in the production of skilled manpower for the sector.

**Figure 3.21:** Patent applications and grants published in India in the last 10 years in the bicycle sector



### 3.5. Conclusions

Bicycle technology has been evolving since the nineteenth century and has witnessed tremendous growth in its scope and markets. The present study aimed to provide a broad overview of the trends in patent filing in this sector, worldwide and in five major countries (including India).

China has emerged as the top patent holder of technologies in the bicycle and bicycle parts sector, which is similar to trends in other fields of technology. The higher number of Chinese patent documents points towards future monopolization of the

### 4.1. Introduction

Apart from patents, industrial design is an important intellectual property right which provides protection for novel and innovatively designed products. Design plays an important role and is one of the prime factors for the selection of the product. Apart from the technology, the major factor commanding the demand of the product is dictated by innovation in its design. Therefore, an analysis of designs registered for bicycles and their components was undertaken for a holistic understanding of trends in innovation in the bicycle sector. Design registrations provide protection to the novel design of marketable products for a maximum period of 15 years, after an initial grant term of 10 years that can be renewed for another 5 years. Furthermore, the WIPO administered Hague system provides a mechanism for registering an industrial design in several countries by means of a single application, filed in one language, with one set of fees.

### 4.2. Methodology

An international design search was conducted on WIPO's Global Design Database which contains a collection of worldwide

industrial design registrations made under the Hague system and the participating national offices including: Canada; USA; Spain; Indonesia; New Zealand, and Japan.

Study data was retrieved from the Global Design Database by integrating keywords and design subclasses, as per the Locarno classification, in the combination strategy. The subclass 12-11 which includes designs of 'Means of Transport or hoisting' specifically for 'cycles and motorcycles' was targeted to search with the keywords 'bicycle' or 'cycle' excluding all 'motorcycle, scooter and car' designs. The data was further screened for designs registered in the last 10 years, i.e. 2007-2017.

### 4.3. Design Analysis

A total of 552 designs were retrieved from the Global Design Database for novel industrial designs of bicycles and their various parts during 2007-2017. These included designs of complete bicycles as well as parts thereof including: cycle frames; saddles; sprockets; parking racks; pedals etc. From these, 484 design records were sourced from the USA, 13 from New Zealand, 2 from Japan and 53 were international applications filed under the Hague system.



The top applicants for design registrations between 2007-2017 along with the number of design registrations are shown in Figure 4.1. Tampa Bay Recreation LLC, USA have the most designs registered for saddles (22), Robert Faber for bicycle carriers and Robert Bosch GmbH has design registrations for a bicycle frame element configured to receive an accumulator.

The top ten bicycle and bicycle parts with the most innovative industrial design

registrations are as shown in Figure 4.2. It is highlighted that apart from applications covering the complete design of bicycles, the most design innovations were recorded in bicycle parts, namely, bicycle frames, bicycle carrier/racks and saddles. Furthermore, the domain of bicycle racks included: stationery bicycle stands fixed to the bicycle; stands for parking bicycles, and multiple parking racks and carriers to be mounted on cars for the transportation of bicycles.

The bicycle designs have been registered for improvements in bicycle ergonomics along with enhancing the aesthetic appeal of the final product. A total of 71 design records were found for complete bicycle designs, whereas 26 were for electric bicycles/ parts thereof and 16 for foldable bicycle designs. Bewegen Technologies Inc., CA and Yosuke Tanaka, JP were among the top applicants for design registrations for electric bicycles.

maximizing comfort and ease during ride. In the last decade, Tampa Bay Recreation LLC, USA emerged as the largest holder of bicycle seat design registrations with 22 design records, while Steven G. Toll emerged as the top individual applicant with 8 bicycle seat designs registered in his name.

International design registrations under the Hague system were mainly filed for bicycle frames (13 registrations), complete bicycles (11 registrations) and electric bicycles (11 registrations). A few illustrative design registrations are provided in Annexure VI.

#### 4.4. Analysis of Designs Registered in the Bicycle Sector in India During 2007-2017

Furthermore, analysis of the design registration records revealed that the applicants with the most design registrations for cycle frames were: Joakim Uimonen, Finland with 10 registered designs for foldable bicycle frames; Specialized Bicycle Components Inc., USA with 8 designs, and Frogbikes Ltd., UK with 4 registered designs for bicycle frames.

Another important component witnessing high innovation is 'bicycle carriers'. Inventor Robert Farber, Canada had 12 registered designs for hitch/trunk mount bicycle carriers and anti-sway bicycle mounts during the study period, while Joseph Flaherty, USA registered 7 designs for carrier racks to be attached to cars for the transportation of bicycles. Apart from these, design innovation in parking stand/rack(s) with multiple bicycle storage in less space is also significant.

The design registration search was conducted on the Indian Patent Office official website to assess the status of design registrations in the Indian bicycle sector in class 12-11, which is dedicated to cycles and motorcycles. In total, 530 results were obtained for bicycles and their parts, out of which approximately half, 264 design registrations, were applications by Tube Investments of India Ltd. for almost all components like bicycle frames, baskets, pedals etc. Hero cycles Ltd., which is one of the major players in the Indian bicycle industry, has 70 registered designs in its name. Other major applicants included Decathlon, Avon Cycles and Eastman Industries Ltd.

Saddles have also been an important component for the IP generation, both for patents and designs. The technology and style are both constantly being improved for

Figure 4.1: Top design applicants in the bicycle and bicycle parts sector during 2007-2017

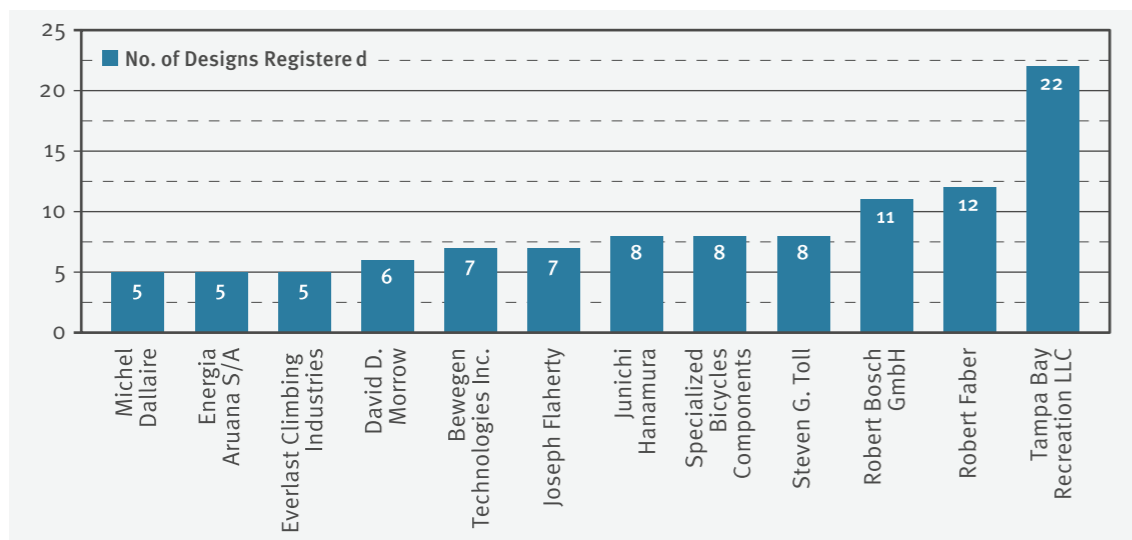
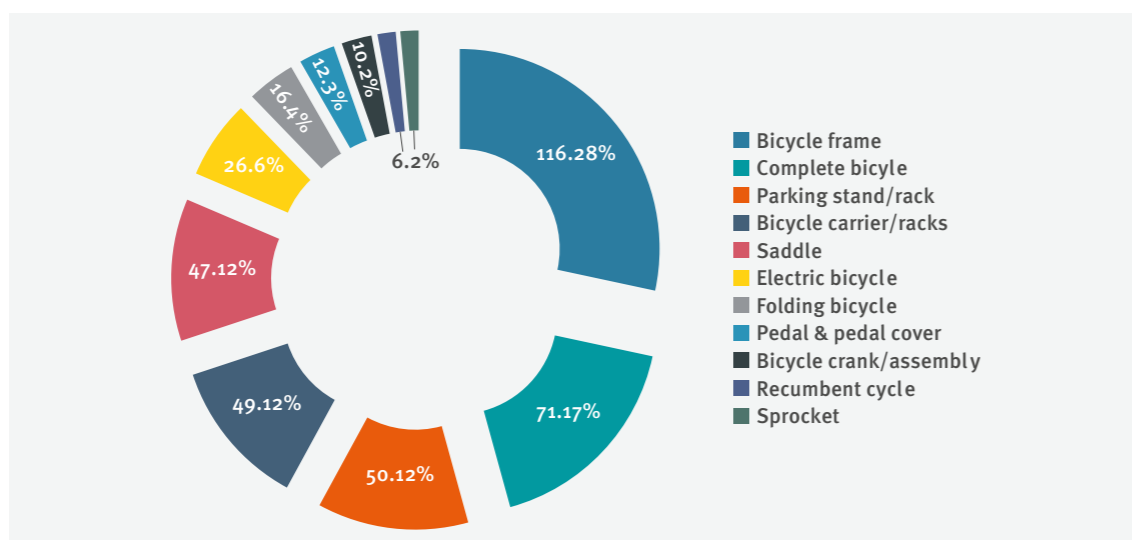


Figure 4.2: Design registration distribution among bicycle and bicycle parts





### 5.1. Introduction

There has been a boom in cycling innovations in many parts of the world, including major cities in the USA and the European Union. Current research in the bicycle sector not only focuses on the health and safety of the riders but on the urgent challenges of congestion of heavy vehicles and the limitation of non-renewable resources that urban regions and their stakeholders face today. Going beyond the analysis, effort has been made to highlight some recent technologies in the bicycle sector, from intelligent lights and solid tyres to 3D printed bicycles. Another objective of this chapter is to present some smart cycling innovations, including information and communication technologies (ICT) for the safety of riders, and the futuristic technology of 3D printing in the bicycle sector.

### 5.2. Intelligent Lights for Safety

A lot of innovative bicycle lights have hit the market during the past 5 years. These lights are intelligent, turn themselves on and off and can tune their brightness settings to the level of light available in the surrounding environment with the help of attached sensors. These lights can even sense oncoming cars, flashing faster than normal to alert the car drivers. These lights are very useful as most of the cyclists aren't accustomed to feeling particularly visible on the roads

at night, but with one of these little boxes blinking away on the handlebars or seat posts, cyclists sense that cars not only see them but will give them more space.

Patent publication **GB2502333A** (2013) describes a speed responsive light control mechanism for bicycles which monitors an input from a speed sensor of the bicycle and determines the required output power to be distributed to the light. The light controller also monitors inputs from a suspension sensor to increase output light levels on rough terrain [33]. Chinese patent application **CN103318305A** (2013) discusses a bicycle light system with a light displaying module, an MCU (Micro Programmed Control Unit) control module, an acceleration sensor and a power supplying system. The light displaying module is mounted on a bicycle and is used to warn other vehicles of the bicycle at night. The acceleration sensor is used to check the motion of the bicycle for automatic switching of the light, therefore no manual switch operation is required [34]. Another Chinese patent publication **CN104477287A** (2015) discloses a bicycle light system, which comprises a light display arranged on the front end of a bicycle handle bar, a single chip microcomputer control connected with the light display module and a power supply module arranged on a bicycle body. This detachable light is capable of sensing the ambient environment with the help of attached sensors and is automatically switched on according to the conditions [35].



Figure 5.1: Intelligent bicycle lights



### 5.3. Electric Assisted Bicycles

There is a great range of electric bicycles (also known as e-bikes) available worldwide. These bicycles are attached with integrated electric motor which can be used for propulsion. Some electric bicycles have a small motor to assist the rider's pedal-power and others are more powerful which tend to be closer to moped-style functionality, however, all retain the ability to be pedalled by the rider and are therefore not electric motorcycles.

Taiwanese utility model **TWM498908U** (2015) provides an energy recoverable electrical bicycle with a motor, a cell module, a driver module, and a control module. The cell module receives and stores a recharging power. The driver module, coupled with the motor and the cell module, is controlled by a control signal for driving the motor to generate braking power and for converting the braking power into recharging power (proportionally to a conversion ratio). According to the claims, this energy recoverable electrical bicycle provides a convenient and comfortable riding experience while recharging [36].

Chinese patent application **CN105151167A** (2015) discloses an anti-theft system for an electric bicycle comprising: a controller; an intelligent control switch; an electric lock and an alarm device arranged on the bicycle body. The controller comprises a master control unit and further comprises a signal detection circuit, a signal receiving circuit, an electric lock control circuit and an alarm circuit which are connected with the master control unit. This system overcomes the shortcomings of traditional mechanical locks and can greatly improve the protection of electric vehicles [37].

Indian patent application **IN20130518314** (2015) relates to a solar bicycle which has provision to run on solar energy. Electricity can also be used to function as a power generator when the bicycle is at rest. A motor, a solar panel, control switch, battery, charger and brake control device are attached to the bicycle. Battery supplies power the horn, indicators and head light for safe driving. The solar panel has been fitted within the bicycle itself [38]. An electric assist bicycle that can apply a sufficient auxiliary driving force with a satisfactory gear change to prevent a reduction in torque transmission efficiency is disclosed in patent application **US9758213B2** (2017). This electric assist bicycle also includes a speed reduction mechanism through pairs of reduction gears and a selection clutch engageable with the reduction gears [39].

### 5.4. 3D Printed Bicycles

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. Complex functional shapes can be produced by this technology using less material than traditional manufacturing methods. Many of the world's engineering industries are currently working to jump on the 3D printed bandwagon and cycling is no different. Mountain bicycle maker Empire joined up with 'additive manufacturing' experts Renishaw to create a 3D printed, titanium version of their MX6-EVO model - named, the MX6-R; it is the only 3D printed bicycle in the world and it costs £20,000 to make [40].

Bicycle components are already being manufactured by the companies using 3D printing technology. Korean patent publication **KR2016050583A** (2016) relates to a manufacturing method of a bicycle frame using a 3D printer with improved properties of lightness and hardness. The bicycle frame is manufactured with metal powders in a 3D printing method to have both the lightness of carbon and the hardness of metal. The surface of the bicycle frame is manufactured in a polygonal shape; a head tube part, a top tube part, a down tube part, a sheet tube part, a sheet stay part, a chain stay part and a bottom bracket shell part are separately manufactured from metal powders by a 3D printing method [41]. 3D printing is definitely one of the futuristic technologies in the bicycle manufacturing sector.

Figure 5.2: Empire's MX6-R, the only 3D printed bicycle in the world with a 33% lighter and six times stronger frame than its aluminium counterpart [42]





## 5.5. ICT Enabled Technologies

Information and Communication Technology (ICT) is playing a huge role in modern bicycle technologies. There remains plenty of opportunity for the incorporation of intelligent ICT systems in the transportation sector as a means to reduce fuel consumption, congestion and road accidents. Some of the areas of ICT that are currently being explored by manufacturers to provide safe, advanced and faster technologies in the sector for bicycle lovers are: Bluetooth-based intelligent systems; electronic sensors; wireless systems; internet of things based technologies; mobile applications, etc. These ICT enabled technologies possess the potential to rapidly change the way people choose to travel. There are several other applications of ICT in the bicycle sector e.g. bicycle traffic management systems. Chinese patent application **CN105551150A** (2016) provides a public bicycle management system and reservation scheduling method with a control module, an electronic control lock, a user intelligent terminal app and a server. By means of the server, a basic database of user data, bicycle data and user reservation data has been established. As per the claims, this data can provide the decision making basis for scheduling and management of public traffic. [43]

A very basic use of ICT has been discussed in Australian patent application **AU2016101533A4** (2015) entitled 'Wireless Bicycle Bell'. A Bluetooth electronic button that attaches to the handlebar of a bicycle is directly paired to a mobile phone application. Upon pressing the electronic button on the handlebar, the mobile phone application will sound a noise like a traditional bell [44]. PCT application **WO2015188655A1** (2015) discloses a Bluetooth-based intelligent exercise bicycle system, comprising an exercise bicycle and a Bluetooth communication terminal. The exercise bicycle is modified to capture the heartbeat of the user-via a heartbeat detection module and speed sensors attached to the bicycle. The

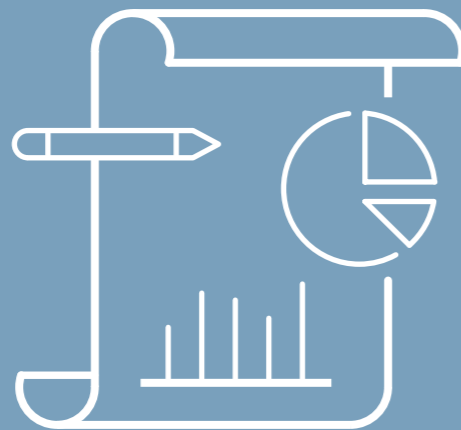
beneficial effects of the invention are that the fitness bicycle will give the user a better sport and fitness experience. At the time of exercise users can get the real-time understanding of their exercise i.e. movement and speed management [45].

A very unique invention **CN106143006A** (2016) discloses a wireless, bicycle tyre air pressure monitoring method based on ICT technology via an air pressure data collector, a processor, an acousto-optic prompt module, a displayer and a signal conversion circuit installed on the bicycle. The wireless, bicycle tyre air pressure monitoring method is safe, reliable and of low cost. The tyre air pressure can be monitored in real time and in addition, different acousto-optic responses can be made according to the different situations. Thus, a cyclist can know the tyre air pressure situation so that corresponding measures can be taken in advance [46].

Another Chinese patent application **CN105365925A** (2016) relates to an Internet-based bicycle-mounted system with self-electricity-generating and self-locking functions. The Internet-based bicycle-mounted system comprises an electricity generator, a voltage stabilizer, a mobile power source, a single-chip microcomputer module, an LED illumination module, a liquid crystal display module, a wireless remote control lock and a Hall sensor. The Internet-based bicycle-mounted system has the advantages of having an electricity generating function and an automatic warning function as well as being capable of displaying the bicycle speed, travel distance in real time, and having a high safety performance [47].

There are lot of other examples to cite and it indicates that ICT-based bicycle technologies are enablers for growth in this sector. Adoption and proper utilization of ICTs will lead to increased yields and quality production of bicycles in this modern epoch. The ICT industry can be resourced, properly managed and mainstreamed into a significant contributor to the bicycle sector.





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## ANNEXURE

(Abstracts of representative patent applications. Some of the patent applications are computer-generated translations. To access the original versions, the application numbers may be used.)

### Annexure 1. Cycle stands; supports or holders for parking or storing cycles; appliances preventing or indicating unauthorized use or theft of cycles; locks integral with cycles; devices for learning to ride cycles) - IPC B62H

Record 1. BICYCLE STAND		
Abstract	Application	
	Number	Date
<p>The present invention relates to an upright bicycle stand device that reduces a space occupied by a bicycle by mounting the bicycle in an upright position, and more specifically, to an upright bicycle stand device which secures commonality for mounting bicycles of various standards, and facilitates storage and portability by reducing a volume thereof when stored away. The upright bicycle stand device according to the present invention comprises: a support body seated on the ground to allow a rear wheel of a bicycle to come into contact with an inside thereof to support the rear wheel; and a front wheel support bar formed uprightly on the support body to fix a front wheel of the bicycle whose rear wheel comes into contact with the inside of the support body. The support body comprises: a first support arm to allow a front portion of the rear wheel of the bicycle to come into contact with an inside thereof to support the front portion of the rear wheel; a second support arm to allow a lower surface of the rear wheel of the bicycle to come into contact with an inside thereof to support the lower surface of the rear wheel; and a support shaft to connect a rear tail of the first support arm and a front end of the second support arm. The second support arm is installed on the support shaft in a hinge structure through a rotation bracket. If the second support arm installed on the support shaft in the hinge structure is hinge-rotated outwards, the first support arm and the second support arm form an unfolded basin shape to stably support the mounted rear wheel of the bicycle. If the second support arm is hinge-rotated inwards, the first support arm and the second support arm cross each other to reduce the volume.</p>	KR201465664A	2014-05-30
	Publication	
	Number	Date
	KR1548516B1	2015-09-01
	Assignee/Applicant	ACS Co. Ltd., KR

### Record 2. DEVICE FOR SAFEKEEPING BICYCLE IN THE FORM OF PLURAL LAYER | MULTI-LAYER BICYCLE STORING APPARATUS, CAPABLE OF EFFECTIVELY PREVENTING A SAFETY ACCIDENT OF USER WHICH IS CAUSED BY THE WEIGHT OF A BICYCLE

Abstract	Application	
	Number	Date
<p><b>Purpose:</b> A multi-layer bicycle storing apparatus is provided to prevent the damage of a bicycle storing box and a bicycle by reducing a downward sudden impact in a withdrawal of bicycle.</p> <p><b>Constitution:</b> A multi-layer bicycle storing apparatus comprises: an individual cabinet wherein a receiving space in which bicycle is stored is formed; a rail which is installed along the bottom surface of each layer of the individual cabinet; a receiving plate which is installed in the inside and the outside of the receiving space along the rail and wherein an inclined surface is formed with being projected from the receiving space by rotating around a pivot axis; and a damping unit which alleviates a sudden impact when the inclined surface is formed by being rotated with being projected from the receiving space. The receiving plate is stored with bicycle along the rail in the receiving space.</p>	KR2009131453A	2009-12-28
	Publication	
	Number	Date
	KR963649B1	2010-06-15
	Assignee/Applicant	2KT Co. Ltd.

### Record 3. BICYCLE INVERSION PREVENTION REINFORCEMENT TOOL

Abstract	Application	
	Number	Date
<p><b>Problem to be solved:</b> To provide a bicycle inversion prevention reinforcement tool of which fitting can be easily performed.</p> <p><b>Solution:</b> The purpose of the present invention is to prevent inversion of a bicycle from an exterior influence by easily fitting a bicycle inversion prevention reinforcement tool without utilization of a trader for strengthening a function of an existing stand table used for a bicycle. According to the present invention, the tool is characterized in that the tool can be easily fitted by fastening a metal fitting with screws to a stand table, and a tendency of easy inversion can be prevented by a reinforcement tool having a width and a length larger than that of the stand table. The bicycle inversion prevention tool has also a safety function for prevention of a traffic accident in such a manner that fluorescent color and a reflective raw material applied to the tool thereby highlighting a bicycle during travel of the bicycle.</p>	JP2014207580A	2014-09-19
	Publication	
	Number	Date
	JP2016060476A	2016-04-25
	Assignee/Applicant	Adachi Yoshikazu



**Record 4. BICYCLE PARKING UNIT**

Abstract		Application	
<p><b>Problem to be solved:</b> To provide a bicycle parking unit capable of reducing production cost and contriving the long life of a roller part of a travelling base by taking sufficient measures in the case of placing a bicycle in a different orientation.</p> <p><b>Solution:</b> This parking unit is equipped with bicycle receiving bases (30, 31) for allowing a bicycle to travel along a rail on the travelling base in a predetermined length mounted on the back side,</p>	a plastic overturning prevention member (1) mounted on both side portions of one end of the bicycle receiving base, and front wheel and stand receiving members (2) mounted on the end portion of the overturning prevention member. The front wheel and stand receiving members are rotatably mounted on the overturning prevention member, thereby enabling to function as a front wheel receiving on one rotating position and as a stand receiving on the other rotating position.	Number	Date
	JP2005305200A	2005-10-20	Publication
		Number	Date
		JP2007112273A	2007-05-10
		Assignee/Applicant	
		Akiyama Seiji	

**Record 5. BICYCLE PARKING LOCK DEVICE**

Abstract		Application	
<p><b>Problem to be solved:</b> To eliminate, as far as possible, danger that is caused when a passer-by other than a bicycle, especially, an infant erroneously steps on a wheel guide part or the like.</p> <p><b>Solution:</b> A bicycle parking lock device 1 comprises: a guide frame body, a wheel guide mechanism, and an arm movable mechanism. A guide frame body has a pair of guide plates facing each other at an interval between them in a right and left direction. The wheel guide mechanism has a wheel guide and a guide support shaft, and inclines the wheel guide around</p>	the guide support shaft from a bicycle non-parking position to a bicycle parking position by means of weight received from a wheel W. The arm movable mechanism has a pair of lock arms and a pair of arm support shafts. The lock arms have: pressed parts that turn the lock arms around the corresponding arm support shafts when the wheel guide inclines; and hook parts projecting inward from the respective outsides of the corresponding guide plates. The pair of hook parts is arranged at an interval between them in a cross direction.	Number	Date
	JP2015256486A	2015-12-28	Publication
		Number	Date
		JP2017119471A	2017-07-06
		Assignee/Applicant	
		Amano Corp	

**Record 6. UPRIGHT ROTATION BICYCLE SUPPORTER | UPRIGHT ROTARY BICYCLE SUPPORTER**

Abstract		Application	
<p>The present invention relates to an upright rotary bicycle supporter. The upright rotary bicycle supporter prevents damage to bicycle parts, enables a user to conveniently and safely place a bicycle by restricting the outer side of the</p>	front wheel of the upright bicycle and allowing an operation unit to control the restricting process, and efficiently uses a space by reducing the occupying space of the bicycle.	Number	Date
	KR201246116A	2012-05-02	Publication
		Number	Date
		KR2013123026A	2013-11-12
		Assignee/Applicant	
		Min Jin Sik	

**Record 7. PORTABLE BICYCLE PARKING SYSTEM | SYSTEME PORTATIF DE STATIONNEMENT DE BICYCLETTES**

Abstract		Application	
<p>This invention is a portable bicycle parking system and is made of aluminium, consisting of three main parts, a common support forming a triangle, an end support forming a half triangle which fits thereto at a right angle on the end of a support triangle and the cross bar which joins the triangles. The design has the ability and tested to tolerate the following: 1. Using two triangles and one crossbar to support a downward maximum force of 300 lbs. (136.08 kg.) 2. Two end supports will support lateral load forces exerted by 20 bicycles parked between them. Each triangle has base supports allowing it to stand upright independently. The end support prevents lateral movement. A cross bar is fitted into the apex of each triangle and one end support is fitted to each end of the unit.</p>	Inserted spring clips are used to secure the end supports to a main support triangle and the crossbar is secured to main support triangles with inserted spring clips. Bicycles are then are hung by the front underpart of the bicycle seat over the crossbar (60 inch lengths) and will support a carrying capacity to a maximum of 5 bicycles. When it has been determined how many bicycles are to be parked, a (recommended) unit to accommodate (20 bicycles), consisting of five triangles, two end supports and four crossbars are fitted together, to make the most efficient use of the parking system. This configuration is considered very safe, stable and well within its design tolerances, however, units can still be expanded, provided an additional end support is adding every 20 bicycles parked.	Number	Date
	CA2553006A	2006-06-27	Publication
		Number	Date
		CA2553006A1	2007-12-27
		Assignee/Applicant	
		Ashton David, North Gower, CA	

**Record 8. STABILIZER TRAINING WHEEL WITH INTEGRAL SUSPENSION | STÜTZRAD MIT INTEGRALER AUFHÄNGUNG | ROUE STABILISATRICE A SUSPENSION INTEGREE**

Abstract		Application	
<p>This invention is a single-piece side wheel attachment member for removably attaching an auxiliary side wheel to a bicycle. The attachment member comprises a single-piece molded structure, including an upper vertical portion and a lower substantially horizontal spindle portion connected to said vertical portion through a C-shape compliant structure for allowing said spindle portion to move vertically when subjected to force. In its natural unbiased condition, the vertical and horizontal portions of the member extend generally perpendicular to one another. The upper vertical</p>	portion includes a projection and at least one through-hole for insertion on the rear wheel axle of the bicycle. The horizontal spindle portion is rotatably engaged by the auxiliary side wheel, therefore acting as its axle. Both ends of the attachment member can angularly move relative to one another due to the C-shape compliant structure. The novelty of this invention resides in the structural simplicity of the side wheel attachment member which is, as previously stated, constructed from a single piece of material molded into a C-shape compliant structure.	Number	Date
	EP2004802343A	2004-12-21	Publication
		Number	Date
		EP1704082B1	2016-02-24
		Assignee/Applicant	
		Brevets Futek-MSM Lté, St-Romuald, QC G6W 5M6, CA, 100728132	



**Record 9. LOCK, BICYCLE LOCKING ASSEMBLY FOR PUBLIC BICYCLE, AND LOCKING PILE OF LOCKING ASSEMBLY**

Abstract		Application	
		Number	Date
<p>The utility model relates to a lock, a bicycle locking assembly for a public bicycle, and a bicycle locking pile of the bicycle locking assembly. The lock comprises a spring bolt module and locking modules. The spring bolt module comprises a spring bolt shell and a first spring bolt. A sliding groove for the first spring bolt to slide is formed in the spring bolt shell. The end, provided with the sliding groove, of the spring bolt shell is provided with an opening for the first spring bolt to extend out. The first spring bolt is located in a lock groove of a main shell in the extending state. A limiting shaft extending out of the spring bolt shell is fixedly connected to the first spring bolt. The spring bolt shell is provided with a sliding groove for the limiting shaft to slide. Each locking module comprises a locking shell, a second spring bolt and a driving mechanism for driving the second spring bolt to slide, wherein the driving mechanism is connected with a control module in a controlled mode, and the second spring bolt has an extending work state and a contracting work state under the action of the driving mechanism. Although the lock is simple in structure, the concept is novel; the two locking modules are adopted for locking, and therefore the thievery prevention performance is higher. The mode that the two sides of a bicycle front fork are locked is adopted, and therefore the lock is firmer in structure and high in thievery prevention performance.</p>		CN201420072105U	2014-02-19
		Publication	
		Number	Date
		CN203681712U	2014-07-02
Assignee/Applicant		Changzhou Eversafe Public Bicycle System Co. Ltd., Changzhou, Jiangsu, 213022, CN	

**Record 10. CHARGEABLE BICYCLE LOCKING PILE**

Abstract		Application	
		Number	Date
<p>The utility model relates to a chargeable bicycle locking pile and belongs to the field of public vehicle leasing equipment. The chargeable bicycle locking pile comprises a pile body, an induction region, a display and voice window, a wheel guide hole, a lock charging region I, a lock charging region II and heat dissipation flow guide grooves, wherein the induction region is arranged on the side surface of the pile body; the display and voice window is arranged on the front side of the bicycle pile; the through wheel guide hole is formed in the lower part of the bicycle pile; both the lock charging region I and the lock charging region II are arranged on the bicycle pile; the lock charging region II is positioned below the lock charging region I; the heat dissipation flow guide grooves are formed in the two inner side surfaces of the pile body. The chargeable bicycle locking pile is reasonable in structure, good in heat dissipation property, safe and practical, cannot be limited by matching of single region with single function, and can improve the induction, locking and charging functions of a bicycle locking position on a bicycle.</p>		CN201420363181U	2014-07-03
		Publication	
		Number	Date
		CN203996563U	2014-12-10
Assignee/Applicant		Hangzhou Rongding Technology Co. Ltd., Hangzhou, Zhejiang, 310012, CN	

**Record 11. VERTICAL RECIRCULATION-TYPE BICYCLE PARKING FACILITY**

Abstract		Application	
		Number	Date
<p><b>Problem to be solved:</b> To realize cost reduction of a vertical recirculation-type bicycle parking facility having bicycle parking platforms circulating around a vertical recirculation path.</p> <p><b>Solution:</b> A vertical recirculation-type bicycle parking facility includes: an inner guide-rail engaged to an upper front-side guide roller bearing-supported at a position that is at substantially the same height as a hanging position P of an individual bicycle parking platform 8 and distanced from the hanging position P toward a side where an entrance/exit opening is located, as a guide-rail of a vertical lift path part FP comprising the entrance/exit opening; and an outer guide-rail engaged to a lower-side guide roller bearing-supported to a front end part that is at a lower end part of the individual bicycle parking platform and distanced from the upper front-side guide roller toward the entrance/exit opening. Further, the outer guide-rail is disposed in a given section adjacent to the entrance/exit opening; the inner guide-rail is disposed individually on the upper and lower sides of the given section in which the bicycle parking platform is held upright by only the outer guide-rail; and on the upper and lower sides of the given section, the bicycle parking platform is held upright by only the inner guide-rail.</p>		JP20129742A	2012-01-20
		Publication	
		Number	Date
		JP2013147867A	2013-08-01
Assignee/Applicant		Daifuku Co. Ltd	

**Record 12. BICYCLE WITH TRAINING WHEEL ASSEMBLY | BICYCLETTE COMPORTANT UN ENSEMBLE ROUE D'APPRENTISSAGE**

Abstract		Application	
		Number	Date
<p>A training wheel assembly includes a training wheel and a training wheel leg coupled to the training wheel and configured (i) to rotationally move the training wheel upward to prevent the training wheel from stabilizing vertical movement of a bicycle and enable two-wheeled riding of the bicycle and (ii) rotationally move the training wheel downward to enable the training wheel to stabilize the vertical movement of the bicycle and provide at least three-wheeled riding experience of the bicycle. The training wheel assembly also includes a locking mechanism configured to lock or unlock rotational movement of the training wheel. The training wheel assembly also includes a training wheel assembly operating device configured to (i) activate the training wheel assembly by moving the training wheel rotationally downward and thereby enabling the training wheel to stabilize the vertical movement of the bicycle and (ii) deactivate the training wheel assembly by moving the training wheel rotationally upward and thereby preventing the training wheel from stabilizing the vertical movement of the bicycle.</p>		WO20151B54659A	2015-06-21
		Publication	
		Number	Date
		WO2015193867A1	2015-12-23
Assignee/Applicant		Fotohi Maidenhair	



#### Record 13. CARRYING AND PARKING DEVICE FOR BICYCLES PARKING EQUIPMENT WHICH CAN PARK BICYCLES AS A CIRCULAR STACKING METHOD

Abstract		Application															
		Number	Date														
<p><b>Purpose:</b> A carrying and parking device for bicycles parking equipment is provided to accurately hold both sides of a front wheel rotary shaft using a clamp in a bicycle stacking process.</p> <p><b>Constitution:</b> A carrying and parking device for bicycles parking equipment comprises a pulling turn-table and a travelling carriage. The pulling turntable grips a bicycle and rotates in a predetermined position. The travelling carriage is located on the lower</p>	part of the pulling turntable. The travelling carriage can move on a rail and reciprocates between an entrance and a bicycle-parking stand. The pulling turntable comprises a wheel touch panel. The wheel touch panel can be connected to the inside of the clamp only when the bicycle nose wheel enters into the clamp. The sensor is located on the rear side of the wheel touch panel. The sensor can sense that the nose wheel of a bicycle is connected on a wheel touch panel (61).																
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KR201114828A	2011-10-20																
Assignee/Applicant																	
Daifuku Korea Co. Ltd.																	

#### Record 14. CYCLE STAND

Abstract		Application															
		Number	Date														
<p>The invention provides a cycle stand comprising: a body having at least one pocket for receiving a wheel of a bicycle, the pocket being of a depth and configuration such that a wheel of 370 mm radius or less can be inserted into the pocket to a depth greater than the radius of the wheel, thereby to prevent or restrict access to a hub of the wheel; mounting means for</p>	securing the body to an underlying substrate; and an anchoring member to which the bicycle may be secured by means of a locking device; the anchoring member being positioned such that when the bicycle is secured thereto by means of a locking device, withdrawal of the bicycle wheel from the pocket is prevented.																
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#### Record 15. PARKING DEVICE OF BICYCLE

Abstract		Application															
		Number	Date														
<p>The invention relates to a parking device of bicycle, comprising an inflator and a connection seat. The inflator comprises an air faucet. The connection seat comprises two ends that are respectively configured with an inserting part and an assembling part, in which the inserting part is inserted into the air faucet of the inflator, and the assembling part is assembled on</p>	a bicycle, for example, on a distal end of a wheel axle, an axle hole of a crank or a frame of the bicycle. Accordingly, with the inflator to be assembled to the bicycle via the connection seat, the bicycle can be stably parked on the ground by the inflator, and the connection seat and the inflator can be mounted together on the bicycle when not in use.																
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#### Record 16. CROWN FORK SUPPORTED BICYCLE CARRIER

Abstract		Application															
		Number	Date														
<p>Disclosed is a bicycle carrier having a support mast, an elongate support member extending from the support mast, and a cradle disposed along the elongate support member. The cradle is for receiving a fork crown of a bicycle. The cradle includes a first hook member extending angularly relative to a longitudinal axis of the elongate support member and a second hook member extending angularly relative to a longitudinal</p>	axis of the elongate support member. The first hook member and the second hook member are spaced-apart so as to allow the fork crown to be received by the cradle. A head tube of the bicycle is disposed between the first hook member and the second hook member. The first hook member and the second hook member are disposed between fork tubes of the bicycle.																
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US20130327802A1	2013-12-12																
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Hammond Malcolm Thomas, North Vancouver																	

#### Record 17. WHEEL CARRIER FOR QUICK FOLDABLE AUXILIARY WHEEL OF BICYCLE WITH SMALL WHEEL DIAMETER

Abstract		Application															
		Number	Date														
<p>The utility model relates to a wheel carrier for a quick foldable auxiliary wheel of a bicycle with a small wheel diameter. The wheel carrier is characterized by comprising a square-groove shaped beam frame, a connecting shaft bracket, a stand leg, a connecting rod, a locking pin, a spring, a hinged shaft of the connecting shaft bracket, a hinged shaft of the stand leg and a hinged shaft of the connecting rod, wherein two extending groove walls of the beam frame are hinged with the connecting shaft bracket; an arc sliding hole is arranged on the connecting shaft bracket; the aperture of locating holes at the two ends of the arc sliding hole is larger than the width of a sliding rail; the aperture of locating holes at the two ends of strip-shaped sliding holes of the connecting rod is larger than the width of the sliding rail; the locking pin is provided with a large-diameter press section and a small-diameter release</p>	section; the locking pin sequentially penetrates through the strip-shaped sliding holes, the arc sliding hole and the spring to be arranged on the two extending groove walls; the outer end of the beam frame is hinged with the upper end of the stand leg; the middle part of the stand leg is hinged with the connecting rod; a large-diameter locking section is arranged in the locating holes of the strip-shaped sliding hole and the locating holes of the arc sliding hole where the connecting shaft bracket and the stand leg are locked; the small-diameter release section is arranged at the position of the strip-shaped sliding hole and the arc sliding hole where the connecting shaft bracket and the stand leg can be rotated. The utility model has the advantages that the wheel carrier can be conveniently folded or unfolded and is economical and practical, and the expenditure is cut down.																
	<table border="1"> <thead> <tr> <th colspan="2">Publication</th> </tr> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>CN201120084298U</td> <td>2011-03-25</td> </tr> <tr> <th colspan="2">Publication</th> </tr> <tr> <th>Number</th> <th>Date</th> </tr> <tr> <td>CN202022260U</td> <td>2011-11-02</td> </tr> <tr> <th colspan="2">Assignee/Applicant</th> </tr> <tr> <td colspan="2">Tianjin Yuandong Lanjian Technology Co. Ltd., Tianjin, 300400, CN</td> </tr> </tbody> </table>		Publication		Number	Date	CN201120084298U	2011-03-25	Publication		Number	Date	CN202022260U	2011-11-02	Assignee/Applicant		Tianjin Yuandong Lanjian Technology Co. Ltd., Tianjin, 300400, CN
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Tianjin Yuandong Lanjian Technology Co. Ltd., Tianjin, 300400, CN																	



#### Record 18. BICICLE PARKING APPARTUS WITH LOCKING DEVICE

Abstract		Application	
The present invention relates to an apparatus for locking and parking a bicycle, including a lower body of a rack which allows the bicycle to enter from one side and to be mounted and has a rear wheel guide rail on the top of the one side into which the rear wheel of the bicycle is inserted and guided; a support installed on the other side of the lower body of the rack and having a front wheel insertion part, where the front wheel is inserted and fixated, at a lower side; a locking bar member rotationally connected to the upper side of the support via a rotary connecting part and having a saddle fixating unit which can cover and fixate a saddle of the bicycle;	a locking unit installed between the support and the locking bar member to set the locking bar member in an opened or a closed state with respect to the support; a fingerprint recognizing unit recognizing the fingerprint of a user; and a main control unit which is connected to the fingerprint recognizing unit and controls the locking unit to be opened or unlocked. The present invention may provide the apparatus for locking and parking a bicycle, capable of preventing separated components such as a front wheel, a rear wheel, a saddle, etc. as well as the bicycle itself from being stolen through a simple configuration.	Number	Date
		KR201392033A	2013-08-02
Publication		Number	Date
		KR1471783B1	2014-12-10
Assignee/Applicant		KIM KU YUB, KR   KWON CHANG HEE, KR	

#### Record 19. ASSEMBLING METHOD APPLICABLE TO CROSS-HOLE LOCK CONTROLLING DEVICE FOR LADDER RACK

Abstract		Application	
The invention relates to an assembling method applicable to a cross-hole lock controlling device for a ladder rack, which comprises a lock base, a lock controlling mechanism, a locking port of a ladder rack and a connecting board. The assembling method is characterized in that the lock base and the ladder rack which are combined onto the connecting board are assembled with a bicycle. The lock base is equipped with an axial cross hole, and a groove for allowing a locking joint or a port of the ladder rack to lock is in butt joint with one end of the lock base. A vertical stop pin blind hole is formed in the lock base and corresponds to a radial table of a lock latch shaft lever in the axial cross hole, and a stop pin and a spring for clamping the radial table	are arranged in the blind hole. A lock cylinder hole is formed at the part of the lock base, which is communicated with the stop pin blind hole, and a lock cylinder controlling mechanism is arranged in the lock cylinder hole to control the contacting and clamping of the stop pin. The ladder rack is arranged on the connecting board. When the ladder rack falls to the ground, the locking port of the ladder rack is just inserted into the groove and just corresponds to a locking joint or a port of the lock latch shaft lever. As long as the exposed end of the lock latch shaft lever is pushed, the other end of the lock latch shaft lever is inserted into the locking port of the ladder rack to lock the ladder rack securely and to allow the bicycle to be firmly locked.	Number	Date
		CN201110168104A	2011-06-21
Publication		Number	Date
		CN102837766A	2012-12-26
Assignee/Applicant		Tianjin Haizhou Scientific Industry and Trading Co. Ltd., Tianjin, 300451, CN   Zhu Yu-guo	

#### Record 20. FAST-ASSEMBLED JOCKEY WHEEL CARRIER OF CHILDREN'S BICYCLE

Abstract		Application	
A fast-assembled jockey wheel carrier of a children's bicycle comprises a jockey wheel support detachably installed on a rear wheel support of the bicycle, wherein the two ends of the jockey wheel support are a first free end and a second free end respectively, a jockey wheel is arranged at the first free end in a rotary mode, a lengthwise outer cover with a U-shaped cross section is detachably arranged on the rear wheel support of the bicycle, the cross section of the second free end is U-shaped, the second free end is inserted between the outer cover and the rear wheel support of the bicycle, and the second free end is detachably connected with the outer cover through a bayonet lock mechanism. The fast-assembled jockey wheel carrier of the children's bicycle can be assembled fast and conveniently without assistant tools, and assembling quality is reliable.		Number	Date
		CN201320122945U	2013-03-19
Publication		Number	Date
		CN203186478U	2013-09-11
Assignee/Applicant		Kunshan Xiaoxiao Dinosaur Children Articles Co. Ltd., Suzhou, Jiangsu, 215343, CN	

#### Record 21. PORTABLE BICYCLE STAND ATTACHED ON PEDAL

Abstract		Application	
<b>Problem to be solved:</b> To provide a detachable portable stand to easily and stably park a bicycle without stand.	clamping part and the leg part. The bicycle stands up straight by use of the portable bicycle stand, with a pedal crank of the bicycle substantially orthogonal to the ground, while clamping the pedal shaft of a pedal in a highest position by the clamping part to bring the leg part into contact with the ground.	Number	Date
		JP2011238321A	2011-10-31
Publication		Number	Date
		JP2013095220A	2013-05-20
Assignee/Applicant		Masuda Techno Co. Ltd.	

#### Record 22. BICYCLE PARKING DEVICE

Abstract		Application	
Provided is a bicycle parking device capable of affixing a bicycle in a standing posture with a simple configuration without lifting the entire bicycle, and without requiring an operational technique for a front-wheel. An upright bicycle-parking device is provided with a crank stopper disposed within the track of a crank, wherein the crank is locked by the crank stopper in such a manner that the movement of the crank in the opposite direction thereof is controlled. When the crank is locked, the tare weight of a bicycle is exerted	in the opposite direction of the locked crank, thereby the crank being affixed by a ratchet mechanism, and the affixed crank is supported by the crank stopper with a rear-wheel as the fulcrum, thereby affixing the bicycle. In cases when the bicycle is taken out, lifting the bicycle to the extent to which the state in which the rotation of the rear-wheel is controlled is released rotates the crank in the forward direction to release the affixing of the bicycle, thus making it possible to pull out the bicycle toward the front and to take out the same.	Number	Date
		WO2011JP75199A	2011-11-01
Publication		Number	Date
		WO2012060384A1	2012-05-10
Assignee/Applicant		Public Management Co. Ltd., JP   Okubo Noriaki, JP	





**Record 23. UNIVERSAL BICYCLE PARKING HANGER**

Abstract	Application	
	Number	Date
<p><b>Problem to be solved:</b> To provide a universal bicycle parking device that is prepared and carried by oneself in order to respond to bicycle parking in the expedition when using a bicycle having no stand for parking the bicycle.</p> <p><b>Solution:</b> When arranging and organizing a bicycle, a portable universal bicycle parking hanger is provided that is configured from three kinds of components including: a pair of insertion belts 1 detachable by one-touch system for winding around a support mechanism 4 in the state where a main frame is previously prepared for including the support mechanism</p>	JP2012270753A	2012-11-26
	JP2014104966A	2014-06-09
	Publication	
	Number	Date
	JP2014104966A	2014-06-09
	Assignee/Applicant	
	Motoyama Toshiyuki	

**Record 24. A LOCKING APPARATUS AND BIKE PARKING APPARATUS**

Abstract	Application	
	Number	Date
<p>The present invention relates to a locking device and a bicycle storage apparatus including the locking device, capable of storing a storage target such as a bicycle easily and conveniently while preventing thefts. According to the present invention, the locking device includes: a fixing unit which is rotated by the load of a storage target to be stored in an empty space formed in the storage target; and a locking unit which is spaced apart from the fixing unit by a predetermined gap and checks a number input control operation of a user to move a brace arranged therein forward or backward, thereby controlling the fixture of the fixing unit. According to the present invention, the bicycle storage apparatus includes:</p>	KR2015173423A	2015-12-07
	KR1645609B1	2016-08-08
	Publication	
	Number	Date
	KR1645609B1	2016-08-08
	Assignee/Applicant	
	Seoheong Bicyclerack Co. Ltd., KR	

**Record 25. BICYCLE GROUND LOCK**

Abstract	Application	
	Number	Date
<p>The utility model relates to a bicycle ground lock which comprises a fixing device, a fixing rod and a telescopic rod. The fixing device comprises a rectangular bottom plate and two symmetric trapezoidal projections arranged on two sides of the upper side of the rectangular bottom plate, corresponding square holes are formed in opposite side walls of the trapezoidal projections, the fixing rod and the telescopic rod horizontally extend out of the square holes respectively, the tail ends of the fixing rod and the telescopic rod contact with each other, a lock hole is formed in the front end of the side wall of the trapezoidal projection connected with the telescopic rod, a rotating shaft perpendicular to the telescopic rod is arranged inside the trapezoidal projection with the lock hole in the side wall, and the trapezoidal projection is slidably connected with the telescopic rod through a hydraulic device. The bicycle ground lock is simple in structure and convenient to use, wheels are unlocked and locked by bilateral sliding of the telescopic rod, and a bicycle can be prevented from being stolen when stopping outdoors.</p>	CN201420651624U	2014-11-04
	CN204210619U	2015-03-18
	Publication	
	Number	Date
	CN204210619U	2015-03-18
	Assignee/Applicant	
	Ningbo Polytechnic, Ningbo, Zhejiang, 315800, CN	

**Record 26. BICYCLE WHEEL SECURING STRUCTURE**

Abstract	Application	
	Number	Date
<p>A bicycle wheel securing structure comprises a wheel securing axle and a wheel-securing bolt. The wheel-securing axle has a first end and a second end. The wheel-securing bolt has a bolt shaft and a bolt head. The bolt shaft is coupled to one of the first and second ends of the wheel-securing axle. The wheel-securing bolt has a frame engageable surface extending in a peripheral direction of the bolt head and is configured to be non-rotatably engaged with a bicycle frame.</p>	TW20132131764A	2013-09-04
	TW201441087A	2014-11-01
	Publication	
	Number	Date
	TW201441087A	2014-11-01
	Assignee/Applicant	
	Shimano KK	

**Record 27. QUICK MOUNTING STRUCTURE OF WHEEL CARRIER IS ASSISTED TO BICYCLE**

Abstract	Application	
	Number	Date
<p>The utility model provides a quick mounting structure of wheel carrier is assisted to bicycle for install bicycle supplementary wheel carrier on bicycle rack, the side of bicycle rack is formed with one flute profile piece, the bicycle assists wheel carrier to insert install on bicycle rack through elastic expansion bayonet lock detachably in flute profile piece. The utility model discloses an above mentioned quick mounting structure need not the instrument can be bare-handed with the supplementary wheel carrier convenient and fast's of bicycle installation to the bicycle rack, the instrument that need not in addition can be bare-handed with the supplementary wheel carrier convenient and fast of bicycle pull down from bicycle rack, convenient and fast, easily operation has improved consumption and has experienced.</p>	CN201620916135U	2016-08-19
	CN205916236U	2017-02-01
	Publication	
	Number	Date
	CN205916236U	2017-02-01
	Assignee/Applicant	
	Tianjin Tandem Industries Co. Ltd., Tianjin, CN	



Record 28. PORTABLE BICYCLE LOCK SETTING DEVICE		
Abstract	Application	
	Number	Date
<p>The utility model provides a portable bicycle lock setting device, including base, support, holder, lock, perpendicular two sides that set up at the base of support to the centre of base is equally divide equally for two -half structure through the articulated elements, the bottom of support between the position be provided with the holder, be provided with adjusting bolt between the extension</p> <p>section of holder, be provided with reset spring on adjusting bolt, the lock setting at the top position of support. Support and base through installing the design and uses of mutually supporting of holder realized that portable carries and it are more stable to lock the wheel, and whole device design is reasonable, and the simple operation can be by further popularization and application.</p>	CN201620805146U	2016-07-26
	Publication	
	Number	Date
	CN205872250U	2017-01-11
	Assignee/Applicant	
	Wenzhou Golden Key Lock Industry Co. Ltd., Wenzhou, Zhejiang, CN	

Record 29. INCLINED BICYCLE CARRIER		
Abstract	Application	
	Number	Date
<p>The utility model relates to an inclination type bicycle storage shelf that comprises a bottom support; the bottom support is crossed to connect with groove-shaped shelf bodies in different heights; the front end of each groove-shaped shelf body comprises a front wheel-fixing shelf; the rear end comprises an inclination angle. The utility model resolves the problems of inconvenience in bicycle access and easy falling in bicycle storage, so as to provide an inclination type bicycle storage shelf characterized in convenient</p> <p>bicycle access and stable structure stable. To use the utility model, store the bicycle in one of the groove-shaped shelf bodies in different heights and arranged in a crossed way, so as to resolve the problem of mutually crossing in bicycle handles. To store a bicycle, it is very convenient to store the bicycle in the groove-shaped shelf body, so that the bicycle can be stably fixed but not easy to fall; to pick up a bicycle, it is convenient to take the bicycle out of the groove-shaped shelf body.</p>	CN200720043275U	2007-08-17
	Publication	
	Number	Date
	CN201086755Y	2008-07-16
	Assignee/Applicant	
	Wuxi Zhenmu Machine Co. Ltd, Wuxi, Jiangsu 217135, CN	

Record 30. DOUBLE-LAYER TYPE BICYCLE CARRIER		
Abstract	Application	
	Number	Date
<p>The utility model relates to a double-layered type bicycle storage shelf that comprises an upper-layered storage shelf and a lower-layered storage shelf, wherein the upper-layered storage shelf is connected with the lower-layered storage shelf with a vertical column; the upper-layered storage shelf is composed of a groove-shaped rail and a slidable groove-shaped shelf body mounted inside the groove-shaped rail; the</p> <p>lower-layered storage shelf is a groove-shaped shelf body. The utility model can improve the utilization rate of blank areas, so that bicycle storage quantity in the unit area can be doubled. The slidable groove-shaped shelf body in the upper-layered storage shelf can slide flexibly inside the groove-shaped rail, so that it is very convenient to access bicycles on the upper-layered storage shelf.</p>	CN200720043273U	2007-08-17
	Publication	
	Number	Date
	CN201086753Y	2008-07-16
	Assignee/Applicant	
	Wuxi Xhenmu Machine Co. Ltd., Wuxi, Jiangsu 217135, CN	



## Annexure 2. Cycle saddles or seats; accessories peculiar to cycles e.g. Article carriers or cycle protectors - IPC B62J

### Record 1. MOUNTING ASSEMBLY FOR CHILD'S BICYCLE SEAT

Abstract	Application							
<p>A bicycle comprising a frame with a head tube at the front end, a fork having at its upper end a steering tube extending upwardly through the head tube, and a stem attached to the handlebars. The stem has a clamp portion clamped around the steering tube. One or more spacer rings or bushings are arranged around the steering tube between the upper end of the head tube and the stem clamp portion. A mounting assembly for mounting a child seat on the bicycle is mounted around the steering tube. The mounting assembly comprises a support body and a clamping element to attach the support body to the steering tube. The clamping element is coupled to the support body and is clamped around the steering tube and arranged between two of said spacer rings or between the head tube and a spacer ring.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>EP2010161757A</td> <td>2010-05-03</td> </tr> </tbody> </table>	Number	Date	EP2010161757A	2010-05-03			
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Assignee/Applicant								
Polisport Plásticos S.A., 3720-024 Carregosa, PT								

### Record 2. SADDLE ADJUSTMENT SYSTEM

Abstract	Application							
<p>A saddle adjustment assembly comprising an adjustable height saddle post, the adjustable height saddle post comprising a first support and a second support, the second support configured to slidably move relative to the first support between at least a raised position and a lowered position, the first support configured to attach to a bicycle frame; a saddle angle adjustment mechanism coupled to the second support, the saddle angle adjustment mechanism comprising a rotatably coupled saddle support configured to couple to a bicycle saddle; wherein the saddle angle adjustment mechanism is configured to enable rotation of the saddle support relative to the second support as a result of the first support moving relative to the second support.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>US15635759A</td> <td>2017-06-28</td> </tr> </tbody> </table>	Number	Date	US15635759A	2017-06-28			
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Assignee/Applicant								
Specialized Bicycle Components Inc., Morgan Hill, CA, US								

### Record 3. CARGO CYCLE WITH PASSENGER SEATS

Abstract	Application							
<p>A cargo cycle includes a frame, a plurality of wheels and a rider seat assembled on the frame, and a passenger compartment supported on the frame. The passenger compartment includes a plurality of side walls and at least one passenger seat disposed inwards of the side walls. The passenger seat has a plurality of reclining positions reclined at different angles relative to the side walls. The passenger seat includes a back support and a seat portion. The back support has a folded orientation in which it is folded down parallel to the seat portion and forms a cover of the passenger compartment.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>TW20165123095A</td> <td>2016-07-21</td> </tr> </tbody> </table>	Number	Date	TW20165123095A	2016-07-21			
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Assignee/Applicant								
Taga Bikes Ltd								

### Record 4. SEAT CONNECTING DEVICE

Abstract	Application							
<p>A seat connecting device includes a first base unit for coupling with a bicycle seat and a second base unit. The first base unit includes an extension having a first end portion with first teeth and a connecting portion. The second base unit includes a body and a connecting member. The body includes a second end portion with second teeth and a sliding groove extending through the second end portion. The connecting member extends through the sliding groove and is detachably connected to the connecting portion. The connecting member selectively presses against a side of the second end portion distant to the second teeth. The second teeth disengageably engages with the first teeth. A water bottle holder can be mounted to the body.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>US15436950A</td> <td>2017-10-19</td> </tr> </tbody> </table>	Number	Date	US15436950A	2017-10-19			
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Assignee/Applicant								
Chuang Louis, Taichung, TW								

### Record 5. LEATHER BICYCLE SADDLE

Abstract	Application							
<p>A leather bicycle saddle includes a leather cover, an arc support supporting the leather cover and having a front end terminating in a head abutment portion and a rear end affixed to a rear bottom side of the leather cover, and an adjustment device including a screw bolt holder affixed to a front bottom side of the leather cover, an adjustment screw bolt abutted against the screw bolt holder. The adjustment seat includes a seat block defining a mounting slot and a screw hole, and a stop block. The stop block is engaged into the open end of the mounting slot and stopped at the head abutment portion of the arc support against the close end of the mounting slot. The screw hole of the seat block receives the adjustment screw bolt.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>US15130023A</td> <td>2016-04-15</td> </tr> </tbody> </table>	Number	Date	US15130023A	2016-04-15			
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Assignee/Applicant								
HSU Chung-Ying, Taichung City, TW   LAI Chien-Shun, Changhua City, TW   Lee Chia-Wen, Huatan Township, TW								

### Record 6. ADJUSTABLE-WIDTH CYCLING SADDLE

Abstract	Application							
<p>An adjustable-width saddle includes a frame having a forward end and a rearward end, the rearward end including a laterally extending bridge, and a one-piece shell. The one-piece shell includes a forward end connected to the forward end of the frame, and a split rearward end including a first rider support and a second rider support that are supported at least in part by the bridge. The rider supports are laterally separated from the second rider support by a lateral gap that is adjustable by flexure of the one-piece shell. A lower side of each rider support defines a first channel that receives the bridge. Fasteners extend through one or more slots formed through the bridge and engage the rider supports to fix the gap at a selected width.</p>	<table border="1"> <thead> <tr> <th>Number</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td>US15619911A</td> <td>2017-06-12</td> </tr> </tbody> </table>	Number	Date	US15619911A	2017-06-12			
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Assignee/Applicant								
Altr Ergo LLC, Greensboro, NC, US								



**Record 7. APPARATUS FOR ADJUSTING BICYCLE SADDLE ANGLE IN SEATED POSITION WHILE DRIVING**

Abstract		Application	
Disclosed is an apparatus for adjusting a bicycle saddle angle in a seated position while driving, which enables a user on a bicycle saddle mounted on a bicycle to adjust an angle of the bicycle saddle with a simple operation according to a riding and driving state, or the user's needs. The apparatus according to the present invention comprises: a mount of which the lower portion is slidable upward and downward through the upper portion of a saddle frame and of which the upper portion is in a first fork shape and has a first hinge pin penetrating the centres of the upper end portions thereof; a supporter of which the lower portion is in a second fork shape	and has a second hinge pin penetrating the centres of the lower end portions thereof and of which the upper side is connected between the upper end portions of the first fork shaped portion by the first hinge pin; and an actuator fixed with a bracket to be spaced apart from one side of the mount and having an expandably-driven portion connected to the second hinge pin on the corresponding position, wherein a saddle of a bicycle is fixed to the upper end of the supporter, and the angle of the saddle is adjusted, about the first hinge pin, according to the movement of the supporter resulting from the operation of the actuator.	Number	Date
		US14778313A	2015-09-18
		Publication	
		Number	Date
		US9783252B2	2017-10-10
		Assignee/Applicant	
		Creven Co. Ltd., Seoul, KR   Kim Choon Choo, Seoul, KR	

**Record 8. BICYCLE SEAT POST ADJUSTING STRUCTURE WHICH COMPRISES A LOWER POST AND AN UPPER POST FIT OVER AND JOINTED TO EACH OTHER, A POSITIONING ASSEMBLY ARRANGED IN THE LOWER POST, AND AN UPWARD-RETURNING ELASTIC ELEMENT BIASING THE UPPER POST**

Abstract		Application	
A bicycle seat post adjusting structure comprises a lower post and an upper post sleevedly jointed to each other, a positioning assembly arranged in the lower post, and an upward-returning elastic element abutting against the upper post. The upper post is provided, on an inside surface thereof, with a first engagement positioning surface. The positioning assembly comprises a primary positioning block having a second engagement positioning surface and a driving axle. The driving axle is operable to push against the primary positioning block to make the second engagement positioning surface and the	first engagement positioning surface engaged with each other for positioning. Through the first and second engagement positioning surfaces disengaging from each other or engaging with each other for positioning, a relative position between the lower post and the upper post can be adjusted or fixed so as to adjust the length of the seat post. Accordingly, the present invention simplifies the structure of the seat post and also reduces the weight of a bicycle mounted with the seat post, thereby achieving the purposes of both providing high quality and lowering down manufacturing cost.	Number	Date
		TW20154140095A	2015-12-01
		Publication	
		Number	Date
		TW201720697A	2017-06-16
		Assignee/Applicant	
		Moderne Tech Corp	

**Record 9. CHILD BICYCLE SEAT**

Abstract		Application	
A child bicycle seat releasably mounted to a bicycle includes a seat assembly including a child seat secured to a tube member, a front tube mounted to a front end of the tube member and having top and bottom cavities, and a quick release clamp mounted to a rear end of the tube member; a handlebar assembly including a hollow pole having two opposite lower slots, a handlebar member threadedly secured to a top of the	hollow pole, and a first quick release skewer secured to both the top cavity and the lower slots to fasten the front tube and the hollow pole together; a clamp assembly including a top tube having two opposite slot members, a second quick release skewer secured to both the bottom cavity and the slot members to fasten the front tube and the top tube together. The clamp assembly has a height adjustment mechanism.	Number	Date
		US15487446A	2017-04-14
		Publication	
		Number	Date
		US9751579B2	2017-09-05
		Assignee/Applicant	
		Mega Productions Co. Ltd., New Taipei, TW   Cheng Wei, Taipei, TW   Lu Ching Hsing, Changhua, TW	

**Record 10. BRACKET COVER**

Abstract		Application	
A bracket cover is configured to cover at least a portion of a bracket that is attachable to a handlebar of a bicycle. The bracket cover includes a cover main body, a first fixing member and a second fixing member. The cover main body includes a portion having a first edge portion and a second edge portion. The portion is between the first and second edge portions being an elastic material. The first fixing member is configured to	detachably fix the cover main body to a first side surface of an outer perimeter portion of the bracket at the first edge portion. The second fixing member is configured to detachably fix the cover main body to a second side surface of an outer perimeter portion of the bracket at the side edge portion. The first and second fixing members are separate members from the cover main body.	Number	Date
		US15483584A	2017-04-10
		Publication	
		Number	Date
		US20170210438A1	2017-07-27
		Assignee/Applicant	
		Shimano Inc., Osaka, JP	

**Record 11. COMBINATION WATER BOTTLE AND PHONE HOLDER WITH MIRROR**

Abstract		Application	
A combination bottle and phone holder has a base, a bottle holder portion and a phone holder portion. In some configurations, the holder also includes a mirror. The bottle holder portion includes a body that is adjustably mounted to the base. The body has an opening configured to receive a water bottle. In some configurations,	the mirror is positioned on a deflectable lid that covers the opening. The phone holder portion includes a plate that is adjustably mounted to the base, a first stop and a second stop. The first stop and the second stop are configured to receive and secure a mobile phone there between.	Number	Date
		US15187336A	2016-06-20
		Publication	
		Number	Date
		US9682738B1	2017-06-20
		Assignee/Applicant	
		3G Bikes LLC, Whittier, CA, US	



**Record 12. BIKE SEAT BOOST POWER SEAT, FITS ALL BICYCLES**

Abstract	Application	
	Number	Date
<p>The device is used to allow any bicycle to have seat height adjustment controlled by the rider while the bicycle is in motion. Seat height is adjustable to suit the needs of the operator. The device will provide up to 6 inches of adjustment range. The lower portion of the device has 2 rails sized and space the same as on all bicycle seats. This allows the unit to be mounted to any style, size and type of seat-post/seat-clamp combination manufactured since 1960. The upper portion of the unit is designed to accept any bicycle seat manufactured today or past 50 years. A control cable exits from the bottom of the lower portion of the unit, runs along the bicycle frame up to a small control lever installed nearby the handlebar grips. This allows easy seat height adjustment while riding without having to remove hands from the handlebar. Activating the lever while body weight is lifted from the seat unlocks the seat and allows it to rise to the level desired. Once the desired seat height is achieved the lever is released, body weight added, locking the seat in the desired position. If desired, the owner may set a memory position so that the next time the seat is raised it automatically stops at this height. To lower the seat the operator removes their weight from the seat, activates the lever unlocking the seat and the while lever remains depressed adds body weight to lower the seat to the desired position. The existing seat clamp may be used to adjust the tilt of the seat or to adjust the seat post height when required to provide the best results from the device.</p>	US14998942A	2016-03-08
	Publication	
	Number	Date
	US20170259864A1	2017-09-14
	Assignee/Applicant	
	Austin Robert, Landrum, SC, US	

**Record 13. BICYCLE BACKSEAT CAPABLE OF STORING ARTICLES**

Abstract	Application	
	Number	Date
<p>The invention discloses a bicycle backseat capable of storing articles. The bicycle backseat comprises a main bearing plate, a drawer and storage boxes, wherein a base plate is arranged at the top of the main bearing plate, a buffering layer is arranged at the top of the base plate, a buffering cushion is arranged at the top of the buffering layer, the drawer is arranged in an inner cavity of the main bearing plate, the three storage boxes are arranged on the inner side of the drawer and distributed triangularly, sealing covers are arranged in positions near tops of inner sides of the storage boxes, rubber layers are also arranged on the inner sides of the storage boxes, sponge layers are arranged at bottoms of the sealing covers, and a limit groove is formed in the middle of the drawer. The main bearing plate and the drawer are arranged, the storage boxes are arranged in the drawer, so that the bicycle backseat has an article carrying function, meanwhile, the sealing covers arranged on the inner sides of the storage boxes and the sponge layers arranged at the bottoms of the sealing covers are matched, the articles stored in the storage boxes can be effectively protected and can be prevented from being damaged.</p>	CN201610711186A	2016-08-24
	Publication	
	Number	Date
	CN106143705A	2016-11-23
	Assignee/Applicant	
	Wuxi Hengteng Precision Machinery Co. Ltd., Wuxi, Jiangsu, CN	

**Record 14. BICYCLE BACKSEAT**

Abstract	Application	
	Number	Date
<p>The utility model aims at solving the problem that when a bicycle backseat is used to carry people, no position can be held, and things carried have no position to be fixed, so that danger is easily to cause. The technical scheme adopted by the utility model is that: the vehicle backseat comprises a seat board, and a leaning rod parallel with the seat board is arranged above the right part of the seat board through an L-shaped rod; two corners on the left side of the seat board are each provided with an upward vertical bar; the tops of the vertical bars are provided with U-shaped openings; one of the U-shaped openings is hinged with a hand lever capable of rotating on a plane of the two vertical bars around a hinging point, and the length of the hand lever is equal to the distance between the two vertical bars. When a bicycle is used for carrying people, the leaning rod can be used for leaning and protect a person on the backseat from falling off during turning left as well; the hand lever is erected when the people get on the bicycle, and laid flat for being held by a hand after the people sit. When the bicycle is used for carrying goods, the goods, the leaning rod, the vertical bars and the hand lever can be wound and knotted by a rope and the like, and the goods can be prevented from damage or hitting others during falling off the vehicle.</p>	CN201520094517U	2015-02-10
	Publication	
	Number	Date
	CN204489025U	2015-07-22
	Assignee/Applicant	
	Tianjin Aidu Bicycle Co. Ltd., Tianjin, 301700, CN	

**Record 15. BICYCLE BASKET CONVENIENT TO MULTIPLE SHAPE ARTICLE OF SPLENDID ATTIRE**

Abstract	Application	
	Number	Date
<p>The utility model provides a bicycle basket convenient to multiple shape article of splendid attire, comprising a base plate, the up end of bottom plate is equipped with first breast board and second breast board, first breast board with the second breast board constitutes an enclosure space, first breast board comprises entity panel, and the second breast board then has the strip material to interweave through the warp direction latitudinal direction to form, first breast board with bottom plate fixed connection, the second breast board with the bottom plate is for can dismantle the connection, first breast board with it has the baffle to peg graft between the second breast board, the mounting bracket that the side fixedly connected with of bottom plate is connected with main body of bicycle, the fixed orifices has been seated up on the mounting bracket. The beneficial effects of the utility model are that: this designs simple structure, and the manufacturing of being convenient for can also hold the article of different volumes and shape, has stronger suitability.</p>	CN201620834443U	2016-08-01
	Publication	
	Number	Date
	CN206067985U	2017-04-05
	Assignee/Applicant	
	Sanheshun (Tianjin) Electronic Technology Co. Ltd., Tianjin, 301713, CN	

**Record 16. CHILD SEAT RAIN COVER**

Abstract		Application	
<b>Problem to be solved:</b> To provide a child seat rain cover designed such that, when the child seat rain cover composed by sewing and joining transparent polyvinylchloride and other members is pulled with hand or caught by something, with a result that strong force is applied to the cover, and even if the strength of the polyvinylchloride decreases due to low temperature or deterioration resulting from aging, a polyvinylchloride sewn part cannot easily be torn.	<b>Solution:</b> In a rain cover for covering a child seat mounted on a bicycle, a member composing a rain cover comprises a transparent polyvinylchloride sheet. Tarpaulin is stuck to at least part of a portion where the polyvinylchloride sheet is to be sewn with other members, and is sewn to the other members together with the polyvinylchloride.	Number	Date
		JP2015205085A	2015-10-16
Publication		Number	Date
		JP2017074933A	2017-04-20
Assignee/Applicant		A&K Ltd. Co.	

**Record 17. VENTILATIVE TYPE BICYCLE SADDLE**

Abstract		Application	
The utility model provides a ventilative type bicycle saddle, including steel pipe, saddle support body, the saddle body of standing vertically, the saddle support body is located the top of steel pipe upright, the saddle body is installed on the saddle support body, and the both ends of saddle support body are equipped with inlet port and vent hole respectively, and this internal cavity that is equipped with of saddle	is equipped with radiator fan in, and radiator fan installs on the saddle support body and is close to the inlet port, is equipped with a plurality of first air vents on the saddle support body, lies in to be equipped with the support frame between the adjacent first air vent, and the support frame lies in the cavity. The utility model aims to provide gas permeability is good, uses comfortable ventilative type bicycle saddle.	Number	Date
		CN201620946167U	2016-08-26
Publication		Number	Date
		CN206067964U	2017-04-05
Assignee/Applicant		Tianjin Vader Bicycle Co. Ltd., Tianjin, 301709, CN	

**Record 18. BICYCLE SEAT POST ASSEMBLY**

Abstract		Application	
A bicycle seat post assembly comprises a first cylinder, a second cylinder, a positioning structure, and a mechanical position informing structure. The second cylinder is configured to be telescopically received in the first cylinder. The positioning structure is configured to relatively position the first cylinder and the second cylinder such that a positional relationship between the first cylinder and the second cylinder is continuously	adjustable within an adjustable position range of the bicycle seat post assembly. The mechanical position informing structure is configured to inform a user that at least one of the first and second cylinders reaches a reference position. The reference position is defined between a maximum-length position and a minimum-length position of the adjustable position range.	Number	Date
		US14175301A	2014-02-07
Publication		Number	Date
		US9580124B2	2017-02-28
Assignee/Applicant		Shimano Inc., Sakai, JP	

**Record 19. BICYCLE SEAT CUSHION ADJUSTING STRUCTURE WHEREBY THE SEAT CUSHION CAN BE SIMULTANEOUSLY PIVOTED AND TILTED BACKWARDLY TO MATCH THE RYTHMN OF THE RIDER TO PROVIDE A QUICK AND EASY ADJUSTMNET OF THE PIVOTING EFFECT**

Abstract		Application	
The present invention is mainly to provide a bicycle seat cushion adjusting structure comprising: a seat post; an inner pipe extending in the seat post, and a pivoting base is provided at the top end of the inner pipe; a control device for controlling and driving the lifting action of the inner pipe; a linkage group having a pivot joint pivotally connected to the pivoting base, the other end of the pivot joint is pivotally connected to a connecting member, the inner pipe being provided with a sliding member, and one end of the sliding member is pivoted with a connecting	member; a connecting group having a plurality of gripping members and pivoted with the pivot joint so as to sandwich the gripping members at a seat bow of the seat cushion. With the aforesaid components, when the seat cushion can be lifted up and down in conjunction with the interlocking of the linkage group, the seat cushion can be simultaneously pivoted and tilted backwardly to match the rhythm of the rider for provide a quick and easy adjustment of the pivoting effect of the seat cushion, thereby improving the handling and safety.	Number	Date
		TW20154126925A	2015-08-19
Publication		Number	Date
		TW201708017A	2017-03-01
Assignee/Applicant		Kind Shock Hi-Tech Co. Ltd.	

**Record 20. BICYCLE SEATPOST ASSEMBLY**

Abstract		Application	
A bicycle seat post assembly comprises a first cylinder, a second cylinder, a mounting structure, a first engagement portion, and a second engagement portion. The second cylinder is configured to be telescopically received in the first cylinder. The mounting structure is attached to a distal end part of the second cylinder. The mounting structure is configured to fixedly	mount a bicycle saddle to the distal end part of the second cylinder. The first engagement portion is provided to an outer periphery of the second cylinder. The second engagement portion is configured to engage with the first engagement portion such that a circumferential position of the mounting structure relative to the second cylinder is selectively adjustable.	Number	Date
		CN201610219625A	2016-04-11
Publication		Number	Date
		CN106240688A	2016-12-21
Assignee/Applicant		Shimano Inc., JP	

**Record 21. SADDLE PILLAR**

Abstract		Application	
The invention is a seat post comprising a tubular body having one end suited to be coupled with the saddle and shaped so that it fits in an apposite tubular housing provided in the casing of the saddle. Said coupling end of the seat post comprises a substantially tubular wall with at least one discontinuous	portion having at least one surface not parallel to the longitudinal axis (X) of the seat post and suited to interfere with the tubular wall of said tubular housing in the casing, so as to prevent the seat post from sliding axially, at least in the direction of extraction from the housing.	Number	Date
		WO20121B57459A	2012-12-19
Publication		Number	Date
		WO2014096903A1	2014-06-26
Assignee/Applicant		Selle SMP SAS DI M. Schiavon, IT	



Record 22. NOVEL BICYCLE SADDLE		
Abstract	Application	
	Number	Date
<p>The invention relates to a novel bicycle saddle which comprises a saddle body and a sleeve, wherein the sleeve sleeves a saddle pipe, and can move up and down along the saddle pipe; an adjusting plate capable of moving up and down along the saddle pipe is arranged on the saddle pipe; the adjusting plate is fixed to the saddle pipe through a bolt; a damping spring and steel wire ropes are arranged between the adjusting plate and the saddle body; two ends of the damping spring are fixedly connected with the adjusting plate and the saddle body</p> <p>respectively; the upper ends of the steel wire ropes are fixed to the lower ends of the saddle body; the steel wire ropes penetrate downwards through the adjusting plate, and are fixed by clamping parts. Through the adoption of the structure, the flexible adjustment of the height of the bicycle saddle and the flexible adjustment of the damping degree of the bicycle saddle can be realized at the same time, so that individual requirements of riders can be greatly met, and the comfortability of riding is improved.</p>	CN201510173248A	2015-04-13
	Publication	
	Number	Date
	CN106143696A	2016-11-23
	Assignee/Applicant	
	Tianjin Lingyan Industry and Trade Co. Ltd., Tianjin, CN	

Record 23. BICYCLE SADDLE STRUCTURE WITH HEIGHT ADJUSTED DURING RIDING		
Abstract	Application	
	Number	Date
<p>The invention discloses a bicycle saddle structure with the height adjusted during riding. A supporting spring is sleeved on a saddle connecting rod sleeve and is used for ejecting a saddle to the highest position when the saddle is not used; a pin hole is formed at the most front end of the saddle; when the saddle is at the highest position, a pin shaft is inserted into the pin hole to position the saddle and is fixed and connected at one end of a steel sheet of a cross beam of a bicycle; and a steel wire bundle is fixed on the other face of the end of the steel sheet and is connected to a hand brake along the steel sheet and the cross beam. A groove from top to bottom is formed on a connecting</p> <p>rod; a bulge correspondingly embedded in the groove is formed in the connecting rod sleeve, so the connecting rod can be ensured to not rotate when sliding up and down in the connecting rod sleeve. When the bicycle is ridden, the saddle is required to be lowered, only by kneading the hand brake, the hand brake drives the steel wire bundle to forwards pull the steel sheet, then the pin shaft is driven to slide from the pin hole, and the saddle downwards slides quickly under the self weight of a rider. Therefore, the feet of the rider can stably and completely land, and the bicycle saddle structure contributes to the personnel safety of the rider in an emergency.</p>	CN201010619277A	2010-12-31
	Publication	
	Number	Date
	CN102416987A	2012-04-18
	Assignee/Applicant	
	The Second Foreign Language School of Shanghai Normal University, Shanghai, 201300, CN	

Record 24. WATERPROOF DIRT-PROOF BICYCLE SADDLE		
Abstract	Application	
	Number	Date
<p>The utility model discloses a waterproof, dirt-proof bicycle saddle, including the steel pipe standing vertically, the saddle body, a supporting plate, a spring, the push rod, the push pedal, the push pedal recess, stay cord and folding back plate. upright the saddle body is connected on the steel pipe top, saddle body middle part upper end is equipped with the push pedal recess, the vertical push rod that is equipped with in the push pedal recess, the push rod top is equipped with the push pedal, the push pedal is the same with push pedal recess shape size, it is inside that saddle body top is passed to the push rod</p> <p>bottom, the push rod lower extreme is equipped with the spring, upright be equipped with the backup pad in the steel pipe, spring lower extreme joint support board, the stay cord is connected to the push rod both sides, folding back plate is connected through the pivot in saddle body upper end both sides, folding back plate inward folding and the contact of push pedal both sides, the stay cord passes saddle body both sides, stay cord tip and the folding back plate outside is connected. Avoid infecting with dust and rainwater, keep the saddle clean, reduce and clean the number of times, prolong the life of saddle.</p>	CN201520973093U	2015-11-30
	Publication	
	Number	Date
	CN205273698U	2016-06-01
	Assignee/Applicant	
	Tianjin Vader Bicycle Co. Ltd., Tianjin, 301709, CN	

Record 25. BICYCLE SADDLE THAT POSSESSES PRESSURE DATA ACQUISITION FUNCTION		
Abstract	Application	
	Number	Date
<p>The utility model discloses a bicycle saddle that possesses pressure data acquisition function, including saddle face, saddle seat frame, supporting beam and pole setting, the saddle face sets up in saddle seat frame's upper surface, the front portion of saddle seat frame's lower surface is provided with preceding slot, and the rear portion of saddle seat frame's lower surface is provided with two back slots, and a supporting beam's front end inserts in the preceding slot, insert a supporting beam's rear end in the back slot, the pole setting sets up on bicycle rack, and the top of pole setting is provided with articulated seat, and</p> <p>passes through articulated seat connect in supporting beam, the saddle face is inside still to be provided with a plurality of pressure sensor that are used for detecting human pressure to saddle different positions to and be used for saving the memory of pressure sensors output data, wherein, pressure sensor sets up respectively in the front portion of saddle face, left back portion and right back portion. This bicycle saddle can take notes when riding the human body to the pressure of the different positions of saddle, and the people of being convenient for correct its position of sitting of riding.</p>	CN201520246987U	2015-04-22
	Publication	
	Number	Date
	CN204937313U	2016-01-06
	Assignee/Applicant	
	Putian University, Putian, Fujian, 351100, CN	



**Record 26. BICYCLE SADDLE WITH SPRING SHOCK ABSORBERS**

Abstract	Application	
	Number	Date
<p>The invention discloses a bicycle saddle with spring shock absorbers. The bicycle saddle comprises a bicycle saddle body. The front end of the bottom of the bicycle saddle body is connected with an arc manganese steel sheet rod, and the rear end of the bottom of the bicycle saddle body is connected with the arc manganese steel sheet rod through the two shock absorbers. It is actually springs which are compressed when the bicycle saddle body is pressed, and corresponding swing arms rotate in a swing mode simultaneously. When a bicycle body is loosened, the bicycle body needs to rebound with spring force, the shock absorbers achieve a damping effect on rebound of the springs at the moment, and the springs tend to be stable after rebounding, so that vibration brought by the springs is greatly reduced. The bicycle saddle has the characteristics of being simple in structure and good in shock absorbing effect.</p>	CN201610444877A	2016-06-21
	Publication	
	Number	Date
	CN106043511A	2016-10-26
	Assignee/Applicant	
	Shaanxi University of Science & Technology, Xi'an, Shanxi, CN	

**Record 27. FOLDABLE PRECEDING INFANT'S SEAT OF BICYCLE**

Abstract	Application	
	Number	Date
<p>The utility model provides a foldable preceding infant's seat of bicycle is linked to each other by chair leg, draw-in groove, seat, support, bracing and cloth pocket and constitutes, be connected with draw-in groove, seat respectively on the chair leg, erection bracing and bracing on the spindle nose of seat, the department is equipped with the locating piece in the middle of the seat, and support and seat after fixing a position through the bracing are the state that the right angle links to each other, support with the seat around be equipped with round cloth pocket and bordure, be equipped with on bordering and bind the area, during the use, place the draw-in groove of this seat respectively on the girder of two slopes of bicycle, make in the girder is in the draw-in groove completely, sit the infant or put down and lie on the seat, just can walk or drive slowly by bike.</p>	CN201520518939U	2015-07-17
	Publication	
	Number	Date
	CN204846144U	2015-12-09
	Assignee/Applicant	
	Liu Yun, Huaipei, Anhui, 235000, CN	

**Record 28. CUSHION FOR CHILD'S BICYCLE**

Abstract	Application	
	Number	Date
<p>The utility model discloses a cushion for a child's bicycle. The cushion comprises a cushion body and further comprises a handle seat made of metal. The edge of the lower end of the rear portion of the cushion body is fixedly sleeved with the handle seat. A handle is obliquely arranged downwards at the lower end of the handle seat and arranged in the transverse direction of the cushion body. The cushion for the child's bicycle is compact in structure, more convenient to move, capable of helping a beginner and free of influences on cushion comfort.</p>	CN201520204043U	2015-04-07
	Publication	
	Number	Date
	CN204489029U	2015-07-22
	Assignee/Applicant	
	Ningbo Topright Leisure Products Co. Ltd., Ningbo, Zhejiang, 315193, CN	

**Record 29. BICYCLE**

Abstract	Application	
	Number	Date
<p>The invention relates to a bicycle having a bicycle seat arrangement which is rotatable with respect to the bicycle and connected to same a bicycle drive which drives a rear wheel and has a bottom bracket and two pedals which are alternately moved downwards and a steering column which is connected at the top to a handlebar and at the bottom to a front wheel fork. The invention is characterized in that the rotational movement of the bicycle seat arrangement viewed in direction of travel is possible to the left and right side and is independent of the steering movement of the bicycle wherein the axis of rotation of the bicycle seat arrangement viewed in direction of travel is arranged in front of the axle of the bottom bracket and wherein the sitting surface of the bicycle seat is arranged viewed in direction of travel behind the axle of the bottom bracket. The rotatable bicycle seat arrangement makes an upright riding position possible by diverting the downward moving leg of the rider through a rotational movement. Simultaneously, it supports the hip side of the other leg. The rider is also supported by the bicycle seat even in an upright riding position.</p>	IN2015DN111A	2015-01-06
	Publication	
	Number	Date
	IN201500111P1	2015-05-29
	Assignee/Applicant	
	Bettin Kartsen	

**Record 30. NOVEL ELASTIC DOUBLE-SIDE USED BICYCLE SADDLE**

Abstract	Application	
	Number	Date
<p>The invention discloses a novel elastic double-side used bicycle saddle which comprises a cushion, an elastic column, a fixing plate, a spiral rod sleeve and through holes, wherein the cushion is arranged on the upper surface and the lower surface of the fixing plate; a semi-arc-shaped groove body is formed in the back end of the cushion; the elastic column used for supporting is arranged in the groove body; a spiral rod sleeve is perpendicularly arranged on the fixing plate; through holes are formed in each of the upper surface and the lower surface of the cushion; the upper through holes and the lower through holes are connected through the spiral rod sleeve respectively; a damping layer is arranged on the cushion at the position of the groove body. According to the novel elastic double-side used bicycle saddle, the structure is simple and novel, the saddle can meet use requirements in various conditions through the double-side design, moreover the comfortability of the saddle can be realized through the design of the elastic column and the damping layer, and the practicability is strong.</p>	CN201410376329A	2014-08-03
	Publication	
	Number	Date
	CN104176161A	2014-12-03
	Assignee/Applicant	
	Ai Huo-mei, Wuhu, Anhui, 241200, CN	





### Annexure 3. Cycles; cycle frames; cycle steering devices; rider-operated terminal controls specially adapted for cycles; cycle axle suspensions; cycle sidecars, forecars, or the like - IPC B62K

#### Record 1. INTEGRAL BICYCLE FRAME

Abstract		Application	
An integral bicycle frame, which comprises a front beam, a rear fork, a head tube, and a seat tube, with these parts being integrally formed by means of a stamping or die-casting process. The front beam comprises an upper beam and a lower beam. The rear fork comprises a rear upper fork and a rear lower fork. The head tube is provided at one extremity of the front beam. One extremity of the upper beam and that of the lower beam converge at the head pipe.	The seat tube is arranged between the front beam and the rear fork. The lower beam and the rear lower fork converge at one extremity of the seat tube; the upper beam and the rear upper fork converge in proximity to the other extremity of the seat tube. The integral bicycle frame not only completely obviates a welding process in the production process, but also ensures that the tubular structure has great lateral impact resistance.	Number	Date
		WO2016CN106369A	2016-11-18
Publication		Number	Date
		WO2017181666A1	2017-10-26
Assignee/Applicant		Taicang Zhetaitian Product Design Co. Ltd.,CN	

#### Record 2. BICYCLE FRAME WITH PASSIVE SEAT TUBE PIVOT JOINT

Abstract		Application	
A bicycle frame assembly that includes an upper frame member and a lower frame member that each extend between a head tube and a dropout. A seat tube extends between the upper frame member and the lower frame member. The seat tube is preferably connected to a bottom bracket of the lower	frame member and is connected by a pivot to the upper frame member so that the seat tube can deflect from a rest position without altering an orientation of a top tube to a bottom tube of the upper and lower frame members, respectively.	Number	Date
		US14878658A	2015-10-08
Publication		Number	Date
		US9789925B2	2017-10-17
Assignee/Applicant		Trek Bicycle Corporation,Waterloo, WI, US	

#### Record 3. BICYCLE CONTROL DEVICE

Abstract		Application	
A bicycle control device is basically provided with a housing, a base member, a user operating member and a fixing member. The housing has an internal space. The base member is at least partially disposed in the internal space and pivotally arranged relative to the housing about a first axis.	The user-operating member is adjustably mounted to the base member and partially disposed in the internal space. The user-operating member has a user-contacting portion. The fixing member fixes the user-operating member to the base member at one of at least a first position and a second position.	Number	Date
		US13923603A	2013-06-21
Publication		Number	Date
		US9771129B2	2017-09-26
Assignee/Applicant		Shimano (Singapore) PTE. Ltd., Jurong Town, SG	

#### Record 4. DEVICE FOR MOUNTING A WHEEL ON A BICYCLE FRAME

Abstract		Application	
The invention relates to a device for mounting a wheel on a bicycle frame. Such a device comprises a pin extending along a longitudinal axis (X) and having an axial through hole. The pin comprises, at a first free end portion thereof, a threading and, at a second free end portion thereof, a pin head. A lever for driving the rotation of the pin about the longitudinal axis (X) is housed in the axial through hole and is axially moveable with respect to the pin between a first operative position and a second operative position. The lever comprises a first lever element housed in the axial through hole when the lever is in said first operative position and a second lever element pivoted to the first lever element about a pivoting axis (Y) perpendicular to the longitudinal axis (X). The second lever element is housed in the axial through hole when the lever is in said first operative position, and is positioned outside the axial through hole when the lever is in said second operative position. In this last position, the second lever element can be rotated with respect to the first lever element about the pivoting axis (Y) and at least one of the first lever element and the second lever element is coupled with said pin through a shape coupling, allowing a torque transfer between lever and pin following the rotation of the second lever element about the longitudinal axis (X).	Number	Date	
	EP2017159887A	2017-03-08	
Publication		Number	Date
		EP3216684A1	2017-09-13
Assignee/Applicant		Campagnolo S.R.L., 36100 Vicenza, IT	

#### Record 5. BUTTERFLY FORMULA BICYCLE HANDLEBAR

Abstract		Application	
The utility model provides a butterfly formula bicycle handlebar, including vehicle mirror mechanism, glue cloth, the handlebar main part, the pipe box, the fixer, vehicle mirror equipment, the connecting axle, the fixed block, the installation piece, the telescopic link, the sleeve pipe, the rotary disk, the dead lever, regulator and U type groove, two vehicle mirror mechanism symmetries are installed on both ends are controlled to the handlebar main part, two are glued the assembly of cloth symmetry in the handlebar main part, install the pipe box on the handlebar main part intermediate position, be equipped with the fixer on the pipe box front end, vehicle mirror equipment right-hand member face intermediate position is fixed with the connecting axle, the connecting axle is connected with the fixed block through the bearing, installation piece lower extreme is equipped with the telescopic link, the sleeve pipe is installed to the telescopic link lower extreme, the sleeve pipe lower extreme is assembling the rotary disk, the rotary disk lower extreme is equipped with the dead lever, the regulator is installed on the sleeve pipe, processing is gone up to the installation piece has U type groove, the utility model discloses convenient to use, the rear portion condition is convenient for observe in the operation of being convenient for, carries high comfort, realizes the illumination, increases the illumination zone.	Number	Date	
	CN201621010611U	2016-08-31	
Publication		Number	Date
		CN206155710U	2017-05-10
Assignee/Applicant		Tianjin Huaxia Bicycle Corporation, Tianjin, 300000, CN	



**Record 6. A SUSPENSION SYSTEM FOR VEHICLES WITH AT LEAST TWO WHEELS**

Abstract	Application	
	Number	Date
<p>A suspension system for vehicles with at least two wheels comprising a rigid structure supporting the axle of a rear wheel of the vehicle and a damping device, the rigid structure being connected to the chassis through corresponding lower and upper mechanisms that comprise corresponding connecting rods, at least one of said connecting rods forming part of a lever whose fulcrum is the articulated joint of the connecting rod with the chassis and whose resistance is an articulated joint with one of the ends of the damping device, with the arrangement and orientation of the connecting rods being such that the Instant Rotation Center (IRC) of the rigid structure remains, during the whole stroke of the damping device, ahead of the articulated joint of the connecting rod of the lower mechanism with the chassis.</p>	EP2015820874A	2015-12-03
	Publication	
	Number	Date
	EP3235711A1	2017-10-25
	Assignee/Applicant	
	Pisa Canyelles Roger,07320 Santa Maria del Cami, ES	

**Record 7. SUSPENSION SYSTEM**

Abstract	Application	
	Number	Date
<p>A compression assembly/system for a front suspension fork for a bicycle is disclosed. The compression assembly/system of the front suspension fork may comprise a combination of improved functional assemblies including a hydraulic bottom-out assembly/mechanism and a low-speed compression assembly/mechanism and a high-speed compression assembly/mechanism. The compression assembly/system of the front suspension fork may comprise an externally-adjustable hydraulic bottom-out mechanism; and substantially co-located external adjustment controls for bottom-out mechanism and low-speed compression mechanism and high-speed compression mechanism. The compression assembly/system may also comprise an axially-oriented (compression) mechanism configured to transmit movement/adjustment radially from inner components to outer components of the mechanisms to be adjusted.</p>	US14460800A	2014-08-15
	Publication	
	Number	Date
	US9758210B2	2017-09-12
	Assignee/Applicant	
	Hayes Bicycle Group Inc., Mequon, WI, US	

**Record 8. BICYCLE FRAME | CADRE DE VELO**

Abstract	Application	
	Number	Date
<p>A sport bicycle frame with a head tube and a seat post mounting arrangement, whereby said bicycle frame is the frame of a single rider bicycle and wherein said seat post mounting arrangement comprises at least two insertion openings each for a seat post, said insertion openings being differently distant from said head tube. The invention is further directed to a set of bicycle components and a single rider sport bicycle comprising said bicycle frame.</p>	WO2016EP53974A	2016-02-25
	Publication	
	Number	Date
	WO2017144100A1	2017-08-31
	Assignee/Applicant	
	BMC Switzerland AG, CH	

**Record 9. FOUR BAR REAR SUSPENSION FOR A BICYCLE**

Abstract	Application	
	Number	Date
<p>A bicycle frame is adapted to provide suspension to a human user. The bicycle frame has a top tube and down tube connected to a head tube. A seat tube fixed to the top tube and down tube connects to the bottom bracket. A chain stay is rotatably coupled to the seat tube at a chain stay pivot. A seat stay is rotatably coupled to the seat tube at a seat stay pivot. An upper shock mount is attached to a distal end of the seat stay forward of the seat stay pivot. A lower shock mount is attached to the chain stay rearward of the seat stay pivot. A shock is connected to the upper shock mount and the lower shock mount passing the seat tube from forward to rearward. A rear axle plate is attached to the seat stay and the chain stay and configured to accommodate a rear axle.</p>	WO2016US63160A	2016-11-21
	Publication	
	Number	Date
	WO2017091516A3	2017-07-06
	Assignee/Applicant	
	Soncrant Jeffrey, Eminent Cycles, US	

**Record 10. BICYCLE OPERATING DEVICE AND BICYCLE SEAT POST APPARATUS**

Abstract	Application	
	Number	Date
<p>A bicycle-operating device comprises a base member, a brake-operating member, and a first operating member. The base member comprises a first end portion, a second end portion, and a grip portion. The brake-operating member is movably coupled to the base member to operate a brake device. The first operating member is coupled to the base member movably between a rest position and an operated position to move a mechanical control cable relative to the base member. The first operating member is movable relative to the base member between the rest position and the operated position without mechanically positioning the mechanical control cable relative to the base member during a movement of the first operating member occurring between the rest position and the operated position.</p>	TW20165132409A	2016-10-06
	Publication	
	Number	Date
	TW201720700A	2017-06-16
	Assignee/Applicant	
	Shimano KK	

**Record 11. BICYCLE PEDAL**

Abstract	Application	
	Number	Date
<p>A bicycle pedal is provided with a pedal body having a front cleat retainer and a rear cleat retainer. The rear cleat retainer is pivotally coupled to the pedal body about a rear pivot axis. The front cleat retainer has a forward cleat stopping point facing towards the rear end of the pedal body. The rear cleat retainer has a rear cleat step-in point facing away from the pedal body. The forward and rear cleat stopping points and the rear pivot axis define a triangle with a first side interconnecting the forward and rear cleat stopping points, a second side interconnecting the rear cleat step-in point and the rear pivot axis, and a third side interconnecting the forward cleat stopping point and the rear pivot axis, with an interior angle of ninety degrees or less between the first and second sides of the triangle.</p>	US2007950002A	2007-12-04
	Publication	
	Number	Date
	US9656720B2	2017-05-23
	Assignee/Applicant	
	Shimano Inc., Osaka, JP   Takahama Kimitaka, Osaka, JP   Kakinoki Nobuyuki, Osaka, JP   Inoue Akira, Osaka, JP   Okajima Shinpei, Osaka, JP	



**Record 12. A HANDLE COVER FOR BICYCLE**

Abstract		Application	
The present invention relates to a bicycle handle cover, and more particularly, to a bicycle handle cover formed to protect fingers from the cold weather of the winter when riding a bicycle as well as to protect the fingers when falling down while riding a bicycle. The inside of the cover comprises: a thumb fastener capable of protecting a thumb; and a fingers fastener in which an index finger,	a middle finger, a ring finger, and a little finger except the thumb are integrally accommodated. And the cover is injection-molded integrally with a handle grip body having a handle fastener and is fixed to a bicycle handle support bar. Moreover, the cover is detachably fixed to the handle grip body by assembling a female button and a male button formed on a fixing hook.	Number	Date
		KR2015151229A	2015-10-28
Publication		Number	Date
		KR2017049326A	2017-05-10
Assignee/Applicant		Lee Yoon Hee, KR   Lee Si Hyung, KR	

**Record 13. A BICYCLE FRAME**

Abstract		Application	
A bicycle frame comprising: a front triangle; a rear frame articulated to the front triangle; a body associated to the front triangle and mobile with respect thereto; a bottom bracket rotatably associated	to the body about a first rotation axis; wherein the rear frame is articulated to the body about a second rotation axis parallel to the first rotation axis.	Number	Date
		TW20165122859A	2016-07-20
Publication		Number	Date
		TW201713544A	2017-04-16
Assignee/Applicant		Pedretti Andrea	

**Record 14. ADJUSTABLE BICYCLE HANDLEBAR**

Abstract		Application	
The utility model discloses an adjustable bicycle handlebar, including handlebar, rubber sleeve, fixing bolt, brake lever, connecting bolt, bracing piece and T type pole, the beneficial effects of the utility model are that: fixing bolt can follow the bracing piece and reciprocate, make this handlebar when installing on the bicycle, fixing bolt is adjusted and the far and near distance of handlebar length can be adjusted at will according to the requirement of self, connecting bolt can dismantle and install in handlebar and bracing piece neck, the brake is installed to the convenience,	accessories such as fixing bolt, install and can't see breaking of contact mouth at the neck, keep can't see any mouth of cutting into from the outward appearance, keep the outward appearance internality to make the outward appearance seem more pleasing to the eye, coordinate, the handlebar design is the half -circular arc form, the operator can use multiple modes to master the handlebar, operator's travelling comfort is increased, wrap up rubber sleeve on the handlebar, thereby, the operator can effectually reduce the friction protection hand of handlebar to the hand when holding the handlebar.	Number	Date
		CN201520303286U	2015-05-12
Publication		Number	Date
		CN204701735U	2015-10-14
Assignee/Applicant		Aita Auto Industry Co. Ltd., Tianjin, 301709, CN	

**Record 15. BICYCLE HANDLEBAR AND MANUFACTURING METHOD THEROF**

Abstract		Application	
The invention relates to a manufacturing method of a bicycle handlebar. The manufacturing method comprises the following steps of separately forming a main handle and two secondary handles, wherein a connecting section and a holding section are integrally formed on each of the secondary handles, and the holding section is provided with a front bending part and a rear bending part; each of the front bending parts is connected to the corresponding connecting section, extends in a direction away from a rear wheel of a bicycle, and is bended downwards; each of the rear bending parts is connected to the corresponding front bending part, bended downwards, and extends in a direction approaching the rear wheel of the bicycle; and	two ends of the main handle are fixed to two joints between the two ends of the connecting sections, on the inner sides of the connecting sections in a joining manner. Through the adoption of the manufacturing method disclosed by the invention, bending parts are omitted for the bicycle handlebar manufactured by the manufacturing method disclosed by the invention, so that the distance between the main handle and the secondary handles is shortened, and time for two hands to alternate on the main handle and the secondary handles is shortened; and besides, the secondary handles are close to a body of a user, so that the user can hold the secondary handles in a sitting posture which conforms to ergonomics.	Number	Date
		CN201510323211A	2015-06-12
Publication		Number	Date
		CN106275206A	2017-01-04
Assignee/Applicant		Xie Wen-zheng   Xie Wen-xiu, Taiwan, CN	

**Record 16. BICYCLE ANGLE ADJUSTMENT DEVICE FOR ROTATIONALLY ADJUSTING A FIRST BICYCLE PART IN RELATION TO A SECOND BICYCLE PART**

Abstract		Application	
The bicycle angle adjustment device according to the invention is suitable for rotationally adjusting a first bicycle part in relation to a second bicycle part. The first bicycle part is provided with a hole with an internal tothing. Also, an intermediate ring is provided with an external and internal tothing, wherein the intermediate ring's external tothing, when 5 mounted, meshes into the internal tothing of the first bicycle part. In this way, a first set of meshing toothings is formed. The	second bicycle part is provided with an external tothing which, when mounted, meshes into the internal tothing of the intermediate ring, in such a way that a second set of meshing toothings is formed. The first set of toothings has a first minimum angular rotation and the second set of toothings has a second minimum angular rotation. The first minimum angular rotation of the first set of toothings differs from the second minimum angular rotation of the second set of toothings.	Number	Date
		WO2008183435A	2008-12-11
Publication		Number	Date
		WO2009077836A3	2009-09-11
Assignee/Applicant		3T Design Ltd., CN   McAinsh Richard, IT	



**Record 17. BICYCLE CONTROL DEVICE**

Abstract	Application	
	Number	Date
<p>A bicycle control device includes a housing member, a control lever member, a shift-operating mechanism and a hydraulic fluid pressure generator. The housing member has an attachment part for attachment to a handlebar, and a grip part extending longitudinally between first and second ends of the grip part. The control lever member pivots relative to the housing member. The shift-operating mechanism is coupled to a shifting device by a control cable. The hydraulic fluid pressure generator has a cylinder, a piston movably disposed within the cylinder by movement of control lever member to generate fluid pressure for controlling a braking device, a piston position adjustment mechanism adjustably coupling the piston with respect to the cylinder to change an initial position of the piston with respect to the cylinder.</p>	US14094736A	2013-12-02
	Publication	
	Number	Date
	US9505463B2	2016-11-29
	Assignee/Applicant	
	Shimano Inc., Sakai, Osaka, JP	

**Record 18. TANDEM BICYCLE**

Abstract	Application	
	Number	Date
<p>A tandem bicycle is provided that has a shortened wheel base between the front and rear wheels that allows a rider to ride comfortably alone from either the front or rear seats, or with a passenger in the front seat. The frame length of the inventive tandem bicycle is comparable to a standard single seat bicycle. The reduced proximity between riders, and the ability to steer for both the front or rear seats on the inventive tandem bicycle improves the level of participation and interaction between the riders. The wheelbase is reduced by bringing the front wheel closer to the front seat position. A reduced diameter front wheel is provided to accommodate rotational clearance of the front pedals thereby allowing two riders to ride on a bicycle frame with a length common to single rider bicycle.</p>	IN2014KN1604A	2014-07-31
	Publication	
	Number	Date
	IN201401604P2	2015-10-23
	Assignee/Applicant	
	Raymond Shawn C.	

**Record 19. HEAD PART ASSEMBLY FOR A BICYCLE**

Abstract	Application	
	Number	Date
<p>A head parts assembly for a bicycle includes two bowls, a plurality of inserting members, two bead nests, and two end caps. The two bowls each are a circular in structure and include a pipe-inserting hole, and a plurality of cable-inserting holes around the pipe-inserting hole. Each of the bowls further includes a receiving cavity in communication with the pipe-inserting holes, and the two bowls are disposed at two ends of the front frame pipe. The inserting members each are a hollow tubular structure with a cable hole for insertion of cables of the bicycle, and are screwed in the cable-inserting holes. The bead nests are rotatably disposed in the receiving cavities and abutted against the close ends, respectively. The two end caps are disposed in the open ends of the receiving cavities, and capable of rotating by abutting against the balls of the bead nests.</p>	IN2014CH2608A	2014-05-27
	Publication	
	Number	Date
	IN201402608I4	2015-07-10
	Assignee/Applicant	
	Neco Technology Industry Co. Ltd.	

**Record 20. NOVEL BICYCLE HEAD HANDLEBAR**

Abstract	Application	
	Number	Date
<p>The invention discloses a novel bicycle head handlebar. The handlebar comprises a cross rod, a vertical rod, grab handles, through holes, a protective cover and arc-shaped grab handles. The cross rod and the vertical rod are formed in an integral design mode and are hollow steel tubes, thread rings are arranged in the two ends of the cross rod, the grab handles are spirally arranged at the two ends of the cross rod, the portions, close to the grab handles, below the cross rod are spirally provided with the arc-shaped grab handles, the multiple through holes are formed in the front side of the cross rod and internally provided with LED lamps, the protective cover is arranged on the through holes, an elastic reinforcing rib locking strip is arranged in the cross rod, penetrates through the grab handles and can be stretched outwards, and the two ends of the reinforcing rib locking strip can be buckled. The novel bicycle head handlebar is simple in structure and ingenious in design, in this way, different handle grabbing modes can be selected according to different road segments, the riding posture is improved, fatigue is relieved, and people do not need to worry about neither the situation that people can not see a road clearly when travelling at night, or the possibility that the lamps are damaged.</p>	CN201410402786A	2014-08-17
	Publication	
	Number	Date
	CN104118514A	2014-10-29
	Assignee/Applicant	
	AI Huo-mei, Wuhu, Anhui, 241200, CN	

**Record 21. REAR WHEEL DRIVE**

Abstract	Application	
	Number	Date
<p>The invention relates to a rear wheel drive, optionally for bicycles or for trailer bicycles. The rear wheel drive, which is advantageous for driving small rear wheels, contains at least one output gear rim of a chain drive, a driving mechanism that has the output gear rim or a driving mechanism that is non-rotatably connected to the output gear rim, a single-part or multipart rear wheel shaft on which the driving mechanism is mounted, and at least one bearing which supports the rear wheel shaft relative to the bicycle frame and which is arranged between the seat of the rear wheel and the driving mechanism. The rear wheel shaft is mounted on only one side of the driving mechanism relative to the bicycle frame. According to the invention, a running wheel coupling that transmits the torque of the driving mechanism directly onto the rear wheel shaft is achieved between the driving mechanism and the rear wheel shaft, whereby the use of output gear rims with particularly small tooth counts becomes possible. Thus, short distances between the rear wheel and the bottom bracket and single-arm suspensions in the bicycle frame can be implemented together with the implementation of suitable developments of the chain drive for small running wheels. Six-speed derailleur gears can be implemented for different running wheel sizes using two output gear rims and a triple-drive sprocket.</p>	EP2012740880A	2012-07-07
	Publication	
	Number	Date
	EP2731857A1	2014-05-21
	Assignee/Applicant	
	Bettin Karsten, 30173 Hannover, DE	



### Record 22. JOINT OF BICYCLE FRAME AND METHOD OF MANUFACTURING SAME

Abstract	Application	
	Number	Date
<p>Provided are: a joint of a bicycle frame and a method of manufacturing the same. The joint comprises a main body and a reinforcement part. The main body is made from high molecular material with fiber. The reinforcement part is a sheet body made from continuous fiber reinforcing material and is fixedly arranged on the main body. The manufacturing method enables the reinforcement part to be disposed in a die used for molding the main body, so that the reinforcement part is fixedly arranged on the main body during or after molding of the main body. Therefore, the provided joint of a bicycle frame has good rigidity and strength, has a thin wall, is light, and meets design needs such as quick production.</p>	CN201310407669A	2013-09-10
	Publication	
	Number	Date
	CN103786822A	2014-05-14
	Assignee/Applicant	
	Giant Manufacturing Co. Ltd., Taiwan, CN	

### Record 23. BICYCLE FRAME

Abstract	Application	
	Number	Date
<p>A bicycle frame including a head tube and a bottom bracket adapted to support a crank set. The frame also includes a tubular frame member that is coupled to the head tube and that has a concave section disposed on an underside of the frame member and spaced from the head tube.</p>	US13242619A	2011-09-23
	Publication	
	Number	Date
	US8720929B2	2014-05-13
	Assignee/Applicant	
	Specialized Bicycle Components Inc., Morgan Hill, CA, US   D'Aluisio Christopher P., Corralitos, CA, US	

### Record 24. CHROMIUM- MOLYBDENUM STEEL BICYCLE FRAME

Abstract	Application	
	Number	Date
<p>The utility model discloses a chromium-molybdenum steel bicycle frame which is formed by a head tube, a middle tube, a beam tube, a rear fork and a bottom bracket which are connected with one another through welding layers, wherein the welding layers are divided into two welding layers, namely a bottom welding layer and a surface welding layer, the bottom layer of the welding layer is an iron weld layer, and the surface layer of the welding layer is a copper weld layer. Bluing sintering marks are respectively formed on the parts, close to the copper weld layer, of the head tube, the middle tube, the beam tube, the rear fork and the bottom bracket, and the copper weld layer is a ring of evenly shining copper weld layer formed by manual lapping. The chromium-molybdenum steel bicycle frame is novel and good looking, and added value of products is increased.</p>	CN201220642388U	2012-11-27
	Publication	
	Number	Date
	CN202944511U	2013-05-22
	Assignee/Applicant	
	Tianjin Aisaike Bicycle Co. Ltd., Tianjin, 300457, CN	

### Record 25. BICYCLE FOLDING STRUCTURE CAPABLE OF EASILY PULLING A BICYCLE IN A FOLDED STATE

Abstract	Application	
	Number	Date
<p><b>Purpose:</b> A bicycle folding structure is provided to transport a folded two-wheel bicycle and to easily transport the bicycle by obtaining a wide space between a front wheel and a rear wheel.</p> <p><b>Constitution:</b> A bicycle folding structure comprises a front wheel part, a rear wheel part, a first connection rod, a second connection rod, a first rotary shaft, a second rotary shaft, and a third rotary shaft. The front wheel part comprises a front wheel. The rear wheel part comprises a rear wheel and a rear wheel supporting part. The first connection rod is connected to the front wheel part. The second connection rod is connected to the rear wheel part. The first rotary shaft rotates the first connection rod from the second connection rod. The second rotary shaft rotates the front wheel part from the first connection rod. The third rotary shaft rotates the rear wheel part from the second connection rod.</p>	KR201236009A	2012-04-06
	Publication	
	Number	Date
	KR1207922B1	2012-12-04
	Assignee/Applicant	
	AICT	

### Record 26. SUPPORTIVE MOTION ASSEMBLY FOR BICYCLE DRIVETRAIN | ENSEMBLE DE MOUVEMENT DE SUPPORT DESTINÉ À UN TRAIN DE TRANSMISSION D'UNE BICYCLETTE

Abstract	Application	
	Number	Date
<p>The present invention provides a supportive motion assembly, for bicycle driving system to convert passive reaction force of paddle action into active linear motion of bicycle, which comprises essentially of a disc plate, triangular brackets pair and compression springs. Incorporation of said motion assembly into drive train of conventional bicycle significantly reduces the human efforts.</p>	WO20161N50161A	2016-05-27
	Publication	
	Number	Date
	WO2016189554A3	2017-01-05
	Assignee/Applicant	
	Sardar Vallabhai, National Institute of Technology, IN	

### Record 27. BICYCLE WITH A COMMON PIVOT SHOCK ABSORBER

Abstract	Application	
	Number	Date
<p>A bicycle with a common point shock absorber comprises a bicycle frame and a shock absorber. The bicycle frame comprises a front frame and a rear frame, an upper linkage device and a lower linkage device connected pivotally to the front frame and the rear frame. The shock absorber is mounted in the bicycle frame and comprises a first connecting member connected pivotally to the upper linkage device, and a second connecting member connected pivotally and coaxially to the lower linkage device and the front frame. Thus, assembling the component and the assembly process can be simplified. Convenience for component assembly and repair has been improved. Manufacturing costs are reduced.</p>	AU2008201974A	2008-05-05
	Publication	
	Number	Date
	AU2008201974B2	2010-10-07
	Assignee/Applicant	
	Giant Manufacturing Co. Ltd, CN	



**Record 28. COLLAPSIBLE BICYCLE**

Abstract		Application	
		Number	Date
<p>The present invention relates to a collapsible bicycle having a frame that can be folded in the plane thereof, the frame having: an upper frame bar having an end on the front side of the collapsible bicycle on which a front wheel fork is supported for mounting a front wheel; a saddle bar having an end for mounting a saddle tube; a lever connected in a jointed fashion to an end of the upper frame bar on the rear side of the collapsible bicycle at a first pivot point and at the end of the saddle bar for mounting the saddle tube at a second pivot point, the lever being disposed on the front side of the collapsible bicycle relative to the saddle bar in a riding position of the collapsible bicycle; and a lower frame bar connected in a jointed fashion on the end of the upper frame bar on the front side of the collapsible bicycle at a third pivot point and on one end of the saddle bar opposite the end for mounting the saddle tube at a fourth pivot point, the first, second, third, and fourth pivot points being disposed relative to each other such that the end of the saddle bar for mounting the saddle tube can be pivoted toward the upper frame bar or away from the upper frame bar in order to move the collapsible bicycle from the riding position to the pushing position or from the pushing position to the riding position.</p>	CN200880018092A	2008-08-06	
	Publication		Number
		CN101808886A	2010-08-18
		Assignee/Applicant	
		Jidian Co. Ltd., CN	

**Record 29. BICYCLE CAPABLE OF BEING FIXED HANDLE WHILE TRANSFORMING POSE THEREOF | BICYCLE WHICH PREVENTS THE FLUCTUATION OF STEERING WHEEL IN CONVERSION POSITION INTO RUNNING POSITION**

Abstract		Application	
		Number	Date
<p><b>Purpose:</b> A bicycle is provided to prevent the fluctuation of steering wheel by bending a steering wheel fixture in a direction of the turning frame which supports a saddle.</p> <p><b>Constitution:</b> A bicycle comprises a mainframe, a handle frame, a turning frame, and a steering wheel and is converted into between a driving position and a stop position. The steering wheel comprises a steering wheel fixing part.</p>	KR201066551A	2010-07-09	
	Publication		Number
		KR2012005866A	2012-01-17
		Assignee/Applicant	
		Jeong Jae Guen	

**Record 30. ANGLE -ADJUSTABLE HANDLES FOR BICYCLE**

Abstract		Application	
		Number	Date
<p>The present invention is composed of three major components including a central section and two side sections respectively attached to two corresponding ends of the central section, wherein the central section is composed of a plurality of blocks to form a pair of clamping lugs respectively at the two corresponding ends. The two side sections are respectively provided with convex lugs that are fit into the clamping lugs. Since the tightening effect generated by bolts piercing through and securing between the clamping lugs and the convex lugs is used, the two side sections and the central section are fixed together to form an angle-adjustable handle for bicycle capable of adjusting the two side section to achieve the holding angles that are the most suitable for both hands of a rider or replacing with other side sections.</p>	TW2007135315A	2007-09-21	
	Publication		Number
		TW200914318A	2009-04-01
		Assignee/Applicant	
		Hsin Lung Accessories Co.	



## Annexure 4. Brakes specially adapted for bicycles - IPC B62L

### Record 1. CARBON FIBER BICYCLE CALIPER BRAKE

Abstract	Application	
A carbon fiber bicycle caliper brake comprises simple components of a curved bar and a triangular bar made of carbon fiber that constitute the carbon fiber bicycle caliper brake. The curved bar has a positioning portion to which a first lining shoe is mounted. The positioning portion of the curved bar is provided with a braking core wire clamping assembly. The curved bar has a curved surface that forms a through slot forming two clamp arms with a spring plate being arranged between the clamp arms. The triangular bar has a first end to which a second lining shoe is mounted, a second end to which is a brake cable connector, and a third end that is pivoted to the curved bar close to a central position and extends through a hole of each clamp arm. A curved sidewall is formed between the third end and the first end so that the sidewall is positioned against an inner side of the spring plate.	Number	Date
	TW2009133166A	2009-09-30
Publication		
	Number	Date
	TW201111225A	2011-04-01
Assignee/Applicant		
Advanced Bikes Composite Co. Ltd.		

### Record 2. BRAKING SYSTEM FOR BICYCLES OR SIMILAR

Abstract	Application	
The invention relates to a braking system for bicycles or similar, designed to be used on any type of bicycle, improving both braking and the aerodynamic performance of the corresponding bicycle, said system comprising a circular body or disc formed exclusively by the area of the brake track, such that the centre of the disc is completely hollow. According to the invention, the disc is joined to a brake caliper that is screwed to a body designed as an extension of the fork of the bicycle and solidly connected to same, said body housing therein sufficient cable for the activation of the braking system.	Number	Date
	WO2017ES70020A	2017-01-13
Publication		
	Number	Date
	WO2017134320A1	2017-08-10
Assignee/Applicant		
Agirre Garmendia Jon, ES		

### Record 3. BICYCLE DISK BRAKE CALIPER

Abstract	Application	
The present invention provides a bicycle disk brake caliper generally composed of a main body, a distribution base, and two connection tubes. When a user grips the brake handle, the oil pressure created may spread to the distribution base via a brake pipe and a shunt connector. The oil pressure then spread to a main chamber sequentially through one of the connection tubes and a first oil path of the main body for driving a piston of the main chamber and brake linings against the brake disc. When the oil pressure in the main chamber can not be increased, the oil pressure in the distribution base can be conducted to another connection tube having an oil pressure limiting unit, via a second oil path of the main body to diffuse to an additional, secondary chamber. This may drive the piston and the brake lining of the secondary chamber against the brake disc to achieve the safety of the break.	Number	Date
	TW2007143424A	2007-11-16
Publication		
	Number	Date
	TW200922831A	2009-06-01
Assignee/Applicant		
Ashima Ltd.		

### Record 4. ABS BRAKE APPARATUS FOR A BICYCLE

Abstract	Application	
ABS (Antilock Braking System) brake apparatus for a bicycle belongs to the field of brake apparatuses for bicycles, and adopts the technical scheme that a wheel frame and a brake mechanism are included, wherein axial through holes are formed on two side walls of the wheel frame; steel balls are respectively mounted in the through holes at two ends; the diameter of the steel balls is equal to that of the through holes; two steel balls are mutually connected through a spring; and a brake block of the brake mechanism is matched with the steel balls of the wheel frame. Compared with the prior art, the ABS brake apparatus has the advantages of simple structure, simplicity and convenience in operation and low manufacturing cost; as retractable steel balls are connected through the springs, the brake block is prevented from excessive brake force, and the anti-lock function can be truly achieved; the ABS brake apparatus effectively improves the braking performance, improves the driving security, greatly reduces the emergency braking risk of a bicycle, can be mounted without changing the structure of the whole bicycle, and is convenient to mount and adjust.	Number	Date
	CN201020151980U	2010-04-08
Publication		
	Number	Date
	CN201769977U	2011-03-23
Assignee/Applicant		
MA Cheng-peng, Jinan, Shandong, 250200, CN		

### Record 5. BICYCLE OIL PRESSURE BRAKING SPLIT-FLOW DEVICE

Abstract	Application	
A bicycle oil pressure braking split-flow device comprises a split-flow body and a valve rod, wherein a first containing chamber and a second containing chamber communicated with the first containing chamber are arranged at one end of the split-flow body, two branching connection holes are formed at the other end of the split-flow body and used for the fact that an oil outlet pipeline is connected with an oil pressure braking device in an assembled mode, two split-flow holes respectively communicated with the two branching connection holes are formed in the first containing chamber, a small-diameter section arranged in the second chamber in a assembled mode is arranged at one end of the valve rod, a large-diameter section arranged in the first containing chamber in an assembled mode is arranged at the other end of the valve rod, a flow channel is formed in the valve rod along the axial direction from the large-diameter section to the small-diameter section and used for the fact that an oil inlet pipeline is connected with a braking grab handle in an assembled mode, and a lateral hole penetrating through the small-diameter section is formed in the flow channel. According to the bicycle oil pressure braking split-flow device, space in handlebars is saved so that other bicycle accessories can be assembled, two braking oil tubes can be output to a braking mechanism, a rider can control motions such as reducing the speed or reducing the speed until the bicycle is stopped of the bicycle by one hand, and self-falling traffic accidents due to original hard-brake conditions are avoided.	Number	Date
	CN201110360986A	2011-11-15
Publication		
	Number	Date
	CN103101598A	2013-05-15
Assignee/Applicant		
Ashima Co. Ltd., Taiwan, CN		



**Record 6. IMPROVED BICYCLE BRAKING HANDLE STRUCTURE**

Abstract	Application	
	Number	Date
<p>The utility model relates to an improved bicycle braking handle structure which comprises a handle and an adjusting mechanism. The handle is provided with a first containing slot and a second containing slot. The adjusting mechanism comprises a knob and an adjusting base. The knob is arranged at the first containing slot and provided with an adjusting lug. The adjusting base is arranged in the second containing slot and moves for limiting position in the second containing slot.</p> <p>The adjusting base is provided with a plurality of adjusting gears which are meshed with the adjusting lug. The improved bicycle braking handle structure not only has high adjusting efficiency, but also has the dynamic real-time adjusting function, and the whole structure is arranged inside the handle, thereby keeping the consistency of the appearance and avoiding worrying about the problem of deformation or damage caused by the collision.</p>	CN200720181655U	2007-10-19
	Publication	
	Number	Date
	CN201128470Y	2008-10-08
	Assignee/Applicant	
	Hongjia Metal Industry Stock Co. Ltd., TW	

**Record 7. OIL-GUIDING DEVICE FOR OIL PRESSURE BRAKE**

Abstract	Application	
	Number	Date
<p>The invention relates to an oil-guiding device for an oil pressure brake, which comprises a brake handle, an oil-guiding piece and a cover plate, wherein an oil storage base is arranged on the brake handle; an oil chamber is arranged in the oil storage base; an oil-guiding base is arranged at the bottom of the oil chamber; an oil inlet and an oil outlet are formed on the oil-guiding base; the oil-guiding piece is combined with the oil-guiding base; an oil pipe opposite to the oil outlet and an oil hole opposite to the oil inlet are arranged on the oil-guiding piece; an end part of the oil pipe faces to a position of a joint of the brake handle and a brake bar; and the cover plate is jointed outside the oil storage base and is used for sealing the oil chamber. When the brake handle is in bias arrangement relative to a bicycle handle, oil materials in the oil chamber are accumulated at one end of the oil chamber close to the brake bar under the action of gravity, the oil materials on the end part of the oil chamber are absorbed by the oil pipe and are output from the oil outlet for braking, and the recycled oil materials are received by the oil inlet so as to enter into the oil chamber, thereby avoiding causing phenomena of air bubbles and air compression and keeping normal running of the brake.</p>	CN201010264147A	2010-08-27
	Publication	
	Number	Date
	CN102372063A	2012-03-14
	Assignee/Applicant	
	Ashima Co. Ltd., Taiwan, CN	

**Record 8. BRAKE FOR BICYCLE**

Abstract	Application	
	Number	Date
<p><b>Problem to be solved:</b> To obtain good effectiveness of braking by optionally adjusting an initial value of sandwiching force in response to a kind of a wheel and a bicycle, without changing a clearance between the rim and brake shoes.</p> <p><b>Soltion:</b> A caliper type brake produces braking force by sandwiching the rim of the wheel from the left and right, and has an expanding mechanism for pushing the brake shoes against the rim by rocking arm parts so that an upper end part mutually expands to open when towing a wire, wherein this expansively opening mechanism has a pipe body connecting part connected with a pipe body, a wire connecting part connected with the wire and a multi-node link for connecting both connecting parts and the upper end part of the arm parts and expanding the upper end part of the arm parts by towing of the wire, and provides a brake for the bicycle for arranging an adjusting mechanism for adjusting an angle of a connecting body to the wire in a state of maintaining a part between the rim and the brake shoes constant between the arm parts and the multi-node link.</p>	JP2009257108A	2009-11-10
	Publication	
	Number	Date
	JP2011102062A	2011-05-26
	Assignee/Applicant	
	Bridgestone Cycle Co.	

**Record 9. BICYCLE BRAKING SYSTEM**

Abstract	Application	
	Number	Date
<p>The invention concerns a braking system comprising two stirrups each fitted with a sleeve for assembly on a cleat, said sleeves being arranged to allow the stirrups to move in axial rotation along a braking stroke defined between a spaced-apart position and a close position, each stirrup being provided with a biasing spring in the spaced-apart position, one of the stirrups being provided with an assembly for adjusting the braking stroke thereof, which comprises a mobile member mounted in axial rotation via a biasing device arranged to exert an immobilising force greater than the force exerted by the spring, and a fixed member, the members having, respectively, a finger and two stops, one stop defining the spaced-apart position, the other stop moving the mobile member by exerting, on the stirrup, a force greater than the immobilising force, the force of the spring equipping the stirrup provided with the adjustment assembly being greater than the force of the spring equipping the other stirrup.</p>	WO2013FR52815A	2013-11-21
	Publication	
	Number	Date
	WO2014091105A1	2014-06-19
	Assignee/Applicant	
	Decathlon, FR	





**Record 10. BRAKE REGULATOR FOR HANDLE**

Abstract	Application	
	Number	Date
<p>Disclosed is a handle brake adjuster which is applicable to bicycles and miscellaneous oil-pressure brake systems, manual brakes or pedal brakes, and the handle brake adjuster comprises a supporting frame, a hydraulic control group, a brace and an adjuster, a hydraulic oil sink and an oil entrance are arranged on the supporting frame, the hydraulic control group is positioned in the inner portion of the supporting frame, so as to control the on-off of the oil entrance, the vehicle can be braked when the oil entrance is closed, the brace is arranged at one end of the supporting frame via a pin and interlocked with the hydraulic control group, the position of the hydraulic control group in the supporting frame can be controlled via the brace. Furthermore, the adjuster is arranged on the supporting frame and connected with the hydraulic control group, the presetting stroke distance between the hydraulic control group inside the supporting frame and the oil entrance can be adjusted by rotating the adjuster, thereby reaching the aim of adjusting the brake sensibility (i.e., the down-pressed stroke length of the brace of the brake handle).</p>	CN200620122630U	2006-07-19
	Publication	
	Number	Date
	CN2928666Y	2007-08-01
	Assignee/Applicant	
	Hengtong Machinery Share Ltd. Co., Taiwan, CN	

**Record 11. BRAKE LEVER**

Abstract	Application	
	Number	Date
<p>In the present invention, there is disclosed a brake lever comprising a base member having a lever arm pivotally mounted to the axis of rotation thereof, the lever arm being moveable between a brake disengagement position and a brake engagement position, the lever arm being provided with an adjuster for selecting one of a plurality of brake disengagement positions, whereby said first adjuster comprises a cam having at least three differing cam surfaces. An actual brake lever for a bicycle is provided with a braking mechanism comprising; a base member, said base member being provided with a cable guide, the base member being further provided with a pivot axis defined at a generally fixed position on the base member, the pivot axis being spaced apart from the cable guide; the braking mechanism further comprising a lever arm formed with a handle portion and a support portion, the support portion mounted for pivotal movement on the base member about the pivot axis from a brake disengagement position to a brake engagement position; a first adjusting mechanism mounted on the base member and being spaced apart from the pivot axis. Both embodiments of the brake lever comprise a second adjusting mechanism arranged inside said support portion of the lever arm and having a cable contact point defined thereon, the second adjusting mechanism being configured to adjust a position of the cable contact point relative to the pivot axis of the lever arm pivotal mounting.</p>	CZ19981410A	1998-05-06
	Publication	
	Number	Date
	CZ293457B6	2004-05-12
	Assignee/Applicant	
	Shimano Inc, JP	

**Record 12. BIKE BRAKE ASSEMBLY WITH LOCKING FUNCTION**

Abstract	Application	
	Number	Date
<p>The present invention relates to a bicycle brake device with a locking function. The bicycle brake device with a locking function has a separate locking module to restrict rotation of a first and a second rotary link of a bicycle brake while operating the brake to simply operate the locking module in a locking mode to make bicycle riding impossible, to prevent theft of the bicycle without a separate locking device such as a lock. The bicycle can be safely fixed and restricted by the locking module if a locking key is carried without carrying a large and heavy separate locking device to conveniently use the bicycle. An operating distance of the locking module can be adjusted to stably apply a locking function to bicycles having wheel rims of various thicknesses. A case cannot be separated while a brake-locking mode is maintained to prevent the brake device from being removed from a bicycle frame to strengthen a theft prevention function.</p>	KR2016130110A	2016-10-07
	Publication	
	Number	Date
	KR1726419B1	2017-04-13
	Assignee/Applicant	
	Hong Seok Yeong, KR	

**Record 13. IMPROVED SYNCHRONOUS BRAKE STRUCTURE OF BICYCLE**

Abstract	Application	
	Number	Date
<p>The utility model relates to an improved synchronous brake structure of a bicycle. The improved synchronous brake structure of the bicycle comprises a brake piece, a brake assembly and a brake cable, wherein the brake assembly is provided with a connecting base, the brake assembly is arranged on the body of the brake piece in cooperation with an adjustment piece, the connecting base is hollow and is provided with a through groove, the brake cable penetrates through the through groove to be fixedly installed on a pressing handle part in an embedded mode, a combined part is formed at the other end of the connecting base, a positioning sleeve is fixedly embedded through the cooperation between the connecting base and the combined part, a hollow stroke chamber is arranged at the end, opposite to the connecting base, of the positioning sleeve, two through holes are formed from the stroke chamber to the other end of the positioning sleeve in a penetrating mode, the brake cable is provided with a pulling line, a clamping part is formed at one end of the brake cable, a sliding block body is arranged at the other end of the brake cable and is assembled in the stroke chamber of the positioning sleeve in a matched mode, two pulling lines extend from the sliding block body and penetrate out of the through holes, and thus the improved synchronous brake structure of the bicycle is obtained.</p>	CN201420238080U	2014-05-09
	Publication	
	Number	Date
	CN203876924U	2014-10-15
	Assignee/Applicant	
	Xie Guo-cheng, Taiwan, CN   Xie Guo-cheng, TW	

**Record 14. BRAKE DISK OF BICYCLE**

Abstract		Application		
<p>The utility model discloses a brake disk of a bicycle. The brake disk of the bicycle comprises an inner disk body and an outer disk body arranged on the periphery of the inner disk body. The outer disk body and a pair of bicycle brake calipers cooperate to achieve a brake function. The outer disk body comprises a brake portion and a first connection portion located on the inner side of the brake portion, the inner disk body comprises an installation portion, a second connection portion and a transition area, the installation portion is connected to a shaft sleeve, the second connection portion is located on the outer side of the installation portion and is matched with the first connection portion, the transition area is connected to the installation portion and the second connection portion, the first connection portion and the second connection portion are connected, the upper surface of the outer disk body and the upper surface of the installation portion are located on the same plane, and the lower surface of the outer disk body and the lower surface of the installation portion are located on the same plane.</p>	Number	Date		
		CN201420600206U	2014-10-16	
	Publication			
	Number	Date		
		CN204250276U	2015-04-08	
Assignee/Applicant				
		Hongzhan Hardware Plastic Products (Suzhou) Co. Ltd., Suzhou, Jiangsu, 215421, CN		

**Record 15. BACK PEDAL BRAKE FOR FRONT WHEEL OR REAR WHEEL OF BICYCLE, HAS BRAKE LUG CONNECTED WITH BOWDEN CABLE, WHERE FRONT OR REAR WHEEL IS BRAKED WITH BACK PEDALS IN POSITIONS AND BACK PEDALS ARE BACKWARDLY ROTATED BY UNLOCKING BRAKE**

Abstract		Application		
<p>The brake has a brake lug connected with a Bowden cable, where a front wheel or a rear wheel of a bicycle is braked with back pedals in common fixed positions. The back pedals are backwardly rotated during travel of the bicycle by unlocking the brake.</p>	Number	Date		
		DE102012001823A	2012-01-31	
	Publication			
	Number	Date		
		DE102012001823A1	2013-08-01	
Assignee/Applicant				
		Frikker Jozsef, Dietzenbach, DE		

**Record 16. ANTI-SKID BRAKE PEDAL**

Abstract		Application		
<p>The invention relates to an anti-skid brake pedal which comprises a pedal bottom plate, and is characterized in that a pedal face cover plate is arranged on the pedal bottom plate, and a plurality of raised anti-skid blocks are arranged on the upper surface of the pedal face cover plate. The anti-skid brake pedal is simple in structure, convenient to mount and firm, and can be replaced; skidding between a sole and the pedal during brake can be avoided when the pedal is in use; and the personal safety of a bicycle driver and a passerby can be protected effectively.</p>	Number	Date		
		CN201310206730A	2013-05-28	
	Publication			
	Number	Date		
		CN103241330A	2013-08-14	
Assignee/Applicant				
		Wuxi Swift Horse Vehicle Industry Manufacturing Co. Ltd., Wuxi, Jiangsu, 214199, CN		

**Record 17. MECHANICAL OIL PRESSURE DISC BRAKE**

Abstract		Application		
<p>The invention provides a mechanical oil pressure disc brake. The mechanical oil pressure disc brake comprises a first part, a caliper structure, a second part and a driven part, wherein the caliper structure is arranged on the first part, the first part and the second part are connected with an oil tube so as to be communicated, the driven structure is arranged on the second part and in connecting driving with a brake cable of a bicycle braking handle, and the second part can be selectively arranged on the first part or the brake handle, and a user can adjust the mounting position of the second part along with the type and the purpose of a vehicle.</p>	Number	Date		
		CN201310739859A	2013-12-23	
	Publication			
	Number	Date		
		CN103723231A	2014-04-16	
Assignee/Applicant				
		Wen Yan-hong, Taiwan, CN		

**Record 18. BRAKING SYSTEM AND V PRESS FROM BOTH SIDES BRAKE WARE**

Abstract		Application		
<p>The utility model relates to a V press from both sides the brake ware, and confession group locates a bicycle, and this bicycle contains two fork arms and a set of wheel set of locating between this two fork arm, and this V press from both sides the brake ware and contains: two brake swing arms supply to face this wheel set pivot ground respectively to organize and locate this two fork arm, and the swing arm of respectively should braking has connecting portion, two brake block subassemblies, the group locates this two brakes swing arm respectively, and respectively this brake block subassembly is concave is equipped with a set of tankage, should assemble the groove and can slide with fixing a position and locate this connecting portion. The utility model discloses other provides a braking system, contains as above V press from both sides the brake ware, other contains a guiding wire assembly, this guiding wire assembly connects this two brakes swing arm, this guiding wire assembly can supply the operation in order to drive this two brakes swing arm and this two brake blocks subassembly towards this wheel set swing.</p>	Number	Date		
		CN201620014164U	2016-01-07	
	Publication			
	Number	Date		
		CN205440733U	2016-08-10	
Assignee/Applicant				
		Wen Yan-hong, Taiwan, CN		

**Record 19. MECHANISM FOR ADJUSTING A DISTANCE BETWEEN WHEEL RIM AND BRAKE PAD**

Abstract		Application		
<p>A brake mechanism of a bicycle brake is provided with two brake arms each including a bifurcated main body having two opposite, longitudinal through slot members, an insert having a longitudinal through slot and disposed in the main body, and a fastening member driven through the through slot members and the through slot to adjustably fasten the insert and the main body together; and two brake pads each threadedly secured to the insert. A movement of each fastening member along the through slot members and the through slot transversely moves one brake pad, thereby adjusting a distance between a wheel rim and one adjacent brake pad.</p>	Number	Date		
		US14264057A	2014-04-29	
	Publication			
	Number	Date		
		US20140231186A1	2014-08-21	
Assignee/Applicant				
		Wu Da Hao, Changhua, TW		



**Record 20. BICYCLE BRAKES HANDLE WITH DECORATIVE COVER**

Abstract	Application	
	Number	Date
<p>The utility model discloses a bicycle brake handle with a decorative cover. At present, an aluminum piece is mainly formed by adopting a metal die casting method which has a high requirement on die casting equipment, high processing energy consumption, large one-time mold investment, and limitation of various factors. The utility model solves the problem that the level of the die casting process of the aluminum piece is generally low in the conventional industry, so that the formation of a product can not be as fine as that of a plastic product. The utility model adopts the technical scheme that the bicycle brake handle with the decorative cover comprises an aluminum brake handle bracket and a fastening ring formed at the lower part of the aluminum brake handle bracket, and is characterized in that the brake handle bracket is connected with the plastic decorative cover through a screw and the plastic decorative cover covers the brake handle bracket. The processing and the surface treatment of the plastic decorative cover are convenient, the color and the material of the plastic decorative cover are treated to be in accordance with those of a whole bicycle (particularly a bicycle handle), and the brake handle bracket is covered by the plastic decorative cover, so as to improve the integrity of a bicycle head component.</p>	CN201120519463U	2011-12-13
	Publication	
	Number	Date
	CN202379038U	2012-08-15
	Assignee/Applicant	
	Jiande Wuxing Bicycle Co. Ltd., Hangzhou, Zhejiang, 311604, CN	

**Record 21. NOVEL BIICYCLE BRAKE BLOCK**

Abstract	Application	
	Number	Date
<p>The utility model discloses a novel bicycle brake block and belongs to a brake which moves substantially parallel to an axle through a brake component. The novel bicycle brake block comprises a brake body and a join body and is characterized in that a ladder-shaped hollow space is formed in the join body, a spring ring and a screw rod are arranged in the hollow space, the screw head part of the screw rod is capable of contacting with the spring ring, and the screw body end protrudes out of the join body; a concave annular groove is formed near the opening end of the hollow space in the join body, the spring ring and the screw rod can be limited in the hollow space through embedding a C-shaped buckle in the concave annular groove, when braking, the screw head part of the screw rod is in contact with the spring ring and inwardly compresses the spring in the hollow space, the elastic force enables the brake body and join body to shake slightly, the contact surfaces of the brake body and a wheel rim rack are changed so that the whole brake surface of the brake body which is originally worn into an incline can contact with the wheel rim rack, and the whole brake device is compressed by the aid of the external force so as to brake safely.</p>	CN201420412585U	2014-07-24
	Publication	
	Number	Date
	CN203996717U	2014-12-10
	Assignee/Applicant	
	XU Jia-hao, Dongying, Shandong, 257000, CN	

**Record 22. TRICYCLE HAND BRAKE**

Abstract	Application	
	Number	Date
<p>The utility model provides a tricycle hand brake, its characterized in that: including pull rod, two a pivoted floodgate fork and restriction floodgate fork pivoted reset spring relatively, two floodgates fork cross arrangements, every floodgate are stuck the end hinge and have been connect a connecting rod, and the floodgate fork was kept away from to two connecting rods one end hinges with the pull rod lower part respectively, said floodgate fork lower extreme is connected with brake portion, and the brake lining of two brake portions sets up relatively. The utility model discloses tricycle hand brake has improved original band-type brake structure, makes two brake blocks clip the wheel both sides simultaneously through the pulling pull rod and brakes, and it is effectual to brake, and the wheel is difficult for out of control, can satisfy the structure of tricycle horizontal pole handle.</p>	CN201520247511U	2015-04-16
	Publication	
	Number	Date
	CN204527495U	2015-08-05
	Assignee/Applicant	
	Wu Wan-yuan, Weifang, Shandong, 261000, CN	

**Record 23. A BRAKE SAFETY APPARATUS**

Abstract	Application	
	Number	Date
<p>A brake safety apparatus that prevents an over the handlebar accident caused by applying too much brake force to the front brake of a bicycle is presented. The present invention works by effectively extending the length of the brake cable connected between the brake lever and the brake caliper on the front brake of a bicycle. An embodiment of brake release system comprises a brake cable housing coupled to a piston at a distal end of the lumen of housing. The piston resides within the lumen of the housing. Between the piston and the proximal end of the housing is a compression spring with a desired spring rate and a preload breakout force. The proximal end of the housing is fixedly coupled to the front braking system of a bicycle.</p>	TW20154141782A	2015-12-11
	Publication	
	Number	Date
	TW201720704A	2017-06-16
	Assignee/Applicant	
	XIE WEN-ZHENG   WARD GREGORY ALAN	

**Record 24. BRAKE WHELL COVER**

Abstract	Application	
	Number	Date
<p>The utility model discloses a brake wheel cover, including wheel cover main part and brake block, this wheel cover main part and brake block all are the arc form, and this brake block is installed on the interior top surface of wheel cover main part. The brake block is installed to interior top surface through in the wheel cover main part, during the brake, only needs pedal this product for this product rotates downwards, thereby makes the brake block support on the rear wheel of bicycle, can realize high -efficient brake, and when loosening when no longer ride this product, the automatic upwards elasticity of this product resets, and the brake block leaves the rear wheel, and light realization is loose stops, and it is very convenient to use.</p>	CN201620601098U	2016-06-15
	Publication	
	Number	Date
	CN205931137U	2017-02-08
	Assignee/Applicant	
	Zhang Zhi-ping, Ganzhou, Jiangxi, CN	



**Record 25. TAPE UNIT TOOL IS STOPPED AND OILY DUAL-BRAKE FORMULA TRICYCLE BRAKE DISC OF STOPPING**

Abstract	Application	
	Number	Date
<p>The utility model discloses a tape unit tool is stopped and oily dual-brake formula tricycle brake disc of stopping, including skidding dish and two piece upper and lower brake shoes, the machinery tight piece of brake lock, the machinery spring of stopping of stopping, the other end is equipped with oil wheel cylinder and the oil spring of stopping of stopping. The utility model discloses it is as an organic whole to combine two kinds of brake structures of mechanical type and the oil formulas of stopping, and the safety of travelling of the brake function of tricycle, guarantee tricycle is realized on safe and reliable ground more.</p>	CN201620146516U	2016-02-26
	Publication	
<p>end between two upper and lower brake shoes is equipped with the machinery tight piece of brake lock and the machinery spring of stopping of stopping, the other end is equipped with oil wheel cylinder and the oil spring of stopping of stopping. The utility model discloses it is as an organic whole to combine two kinds of brake structures of mechanical type and the oil formulas of stopping, and the safety of travelling of the brake function of tricycle, guarantee tricycle is realized on safe and reliable ground more.</p>	CN205469612U	2016-08-17
	Assignee/Applicant	
Yan Rong-lu, Chongqing, 400020, CN   DAI Jin-hong		

**Record 26. REAR WHEEL HANDBRAKE AND FOOTBRAKE DOUBLE-BRAKE BICYCLE**

Abstract	Application	
	Number	Date
<p>The invention discloses a rear wheel handbrake and footbrake double-brake bicycle which can ensure safety. A hand brake is allocated as usual; a middle shaft between a middle joint and a crank is provided with an overrun clutch; an external star wheel is connected together with a transmission end; a roller moves to the gap big end of the planetary wheel to overrun and forward when a pedal is stepped forwards, the roller moves to the gap small end to be conjugated when the pedal is stepped backwards, and the driving end of the external star wheel pulls tightly an added back brake to reduce the speed and brake;</p>	CN200910160756A	2009-07-11
	Publication	
<p>if the crank has poor position, a wrench is pressed to pull a pusher dog so as to enable the roller to move to the gap big end of the star wheel, so that getting on-off and braking the bicycle can be easily realized; the foot brake is rapid, powerful and convenient, and can relieve the swink of braking by left hands at the conditions of large slopes, long slopes, heavy loading, hard braking and cold places; double brake can make the brake more effective, and the rear wheel handbrake and footbrake double-brake bicycle has simple structure, firmness, long service life, few parts and easy mounting-dismounting as well as repair.</p>	CN101700803A	2010-05-05
	Assignee/Applicant	
Li You-wei, Xiamen, Fujian 361004, CN		

**Record 27. BICYCLE ENERGY STORAGE BRAKE EQUIPMENT**

Abstract	Application	
	Number	Date
<p>The invention relates to brake equipment, in particular to bicycle brake equipment which can store the energy. The bicycle brake equipment is designed according to the energy storage principle of a volute spring, can store the kinetic energy into the elastic potential energy of the volute spring in the braking process and then releases the elastic potential energy when being started. The bicycle brake equipment comprises an axle shaft part, a gear changing part, a volute spring mechanism, a big gear wheel and a shifting fork, wherein the volute spring mechanism is arranged on the gear</p>	CN200910045254A	2009-01-13
	Publication	
<p>changing part; the big gear wheel is arranged on the axle shaft part; the upside of the big gear wheel is connected with the gear changing part and the downside thereof is arranged in the interior of the shifting fork; and the gear changing part comprises a pinion wheel, a dryer gear, a gear, a baffle plate and a wheel axle. The pinion wheel is meshed with the dryer gear which is respectively connected with the gear and the baffle plate and locked by a nut cap; and the pinion wheel is connected with an outside baffle plate by a wheel axle and locked by the nut cap.</p>	CN101774415A	2010-07-14
	Assignee/Applicant	
Xia Yun, Shanghai 200237, CN   XIAO Hong-bo		

**Record 28. BICYCLE BRAKE CLIP**

Abstract	Application	
	Number	Date
<p>The utility model provides a bicycle brake clip, which is characterized in that a copper sleeve, a shaft sleeve, a sleeve cover, a spring, an adjusting seat and a combination sleeve are combined in the axle hole on the bottom of a brake body, and then a bolt and a washer are penetrated in the axle hole to be screwed in a screw hole on the protruded shaft of the frame for positioning. The sleeve cover, the spring and the adjusting seat are limited by the shaft sleeve and the combination sleeve to be a whole body; the inner wall of the through hole of the combination sleeve is</p>	CN200820178399U	2008-11-12
	Publication	
<p>provided with a protruded ring, and the protruded ring is inserted into a ring groove on the surface of one side edge of the shaft sleeve to form a limiting state, and the other side edge of the shaft sleeve is sleeved into the through hole of the copper sleeve, and then is slightly exposed from the axle hole of the brake body to be firmly combined with the washer, therefore, with the shaft sleeve and the combination sleeve, the sleeve cover, the spring and the adjusting seat are combined into a whole body, thus realizing the rapid and direct assembly on the frame.</p>	CN201338703Y	2009-11-04
	Assignee/Applicant	
Zhang Star Industrial Co. Ltd., Zhanghua, Taiwan, TW		



**Record 29. BRAKE-SENSING DEVICE FOR BICYCLE**

Abstract		Application	
		Number	Date
<p>The utility model provides a brake-sensing device for a bicycle, which comprises a base unit, a moving unit, a spring, a first buckle unit and a second buckle unit. The moving unit is limited at the base unit site and can conduct retractile movement. The spring can enable the retracted moving unit to automatically return to the starting location. The first buckle unit and the second buckle unit are connected with the outer walls of the base unit and the moving unit respectively, and can be buckled in different positions of the brake line of a brake respectively.</p>	<p>When the brake actuates, a circuit connected with the sensing device is connected or disconnected, and another set of warning lamps arranged on the bicycle can generate a predetermined lighting effect, so as to improve the traveling safety of the bicycle at night. During usage, the original bicycle components are not required to be replaced or dismantled, resulting in more usage convenience. The sensing device can also be equipped with different light control systems, so that the light of the bicycle can be in variety and has more choices.</p>	CN200920173895U	2009-09-10
		Publication	
		CN201494577U	2010-06-02
Assignee/Applicant			
Fan Yu-xiong, Hsinchu, Taiwan, CN			

**Record 30. BRAKING LINKAGE DEVICE FOR BICYCLE**

Abstract		Application	
		Number	Date
<p>The invention relates to a braking linkage device for a bicycle, which comprises a front braking substrate, a rear braking substrate, a front braking handle, a rear braking handle and a linkage mechanism. The front braking substrate is fixed at one end of the handles of the bicycle; one end of the front braking substrate, which is close to grips of the bicycle is provided with a first pivot part and a second pivot part; the rear braking substrate is fixed at the other end of the handles of the bicycle; the front braking handle is pivoted on the first pivot part of the front braking substrate, the rear braking handle is pivoted on the rear braking substrate; the linkage mechanism comprises a fixture block and a linkage line; the fixture block is pivoted on the second pivot part; the fixture block can fasten the front braking handle; and the linkage line is connected with the rear braking handle and the fixture block, so that the rear braking handle is linked with the fixture block.</p>	<p>front braking handle is pivoted on the first pivot part of the front braking substrate, the rear braking handle is pivoted on the rear braking substrate; the linkage mechanism comprises a fixture block and a linkage line; the fixture block is pivoted on the second pivot part; the fixture block can fasten the front braking handle; and the linkage line is connected with the rear braking handle and the fixture block, so that the rear braking handle is linked with the fixture block.</p>	CN200910129244A	2009-03-19
		Publication	
		CN101837817B	2012-11-14
Assignee/Applicant			
Zheng Zong-ming, Taiwan, CN			

**Annexure 5. Rider propulsion of wheeled vehicles or sledges; powered propulsion of sledges or cycles; transmissions specially adapted for such vehicles - IPC B62M**

**Record 1. DEVICE FOR MEASURING PEDALING FORCE OF BICYCLE**

Abstract		Application	
		Number	Date
<p><b>Purpose:</b> A pedalling force measuring device for a bicycle is provided to enable a user to accurately and easily recognize the motion quantity of the user by converting force applied to a pedal into torque and calorie.</p> <p><b>Constitution:</b> A pedalling force measuring device for a bicycle</p>	<p>comprises a connecting plate and a strain gauge. The connecting plate is located between a pedal body and a foothold. The strain gauge is attached on the connecting plate. When the connecting plate is bent by power, the strain gauge measures the displacement of the connecting plate.</p>	KR201028755A	2010-03-30
		Publication	
		KR201109153A	2011-10-06
Assignee/Applicant			
AICT			

**Record 2. STEP-IN-SELF-ENCLOSED PEDAL FOR BICYCLE**

Abstract		Application	
		Number	Date
<p>The utility model discloses a step-in self-enclosed pedal for a bicycle, and belongs to a pedal. The step-in self-enclosed pedal comprises a pedal body and a self-enclosed component, and is characterized in that inserting ports for clamping the pedal body are formed downwards in both sides of a substrate of the self-enclosed component; elastic sheets consisting of three-quarter circular arcs for enclosing a shoe upper extend obliquely upwards from both sides of a pedal plate which projects in the middle; arc-shaped hollow sliding chutes are formed in connecting positions between the integral pedal plate and the two elastic sheets respectively; the upper surface of the substrate is provided with two brackets of which the tops are provided with rivets; the rivets pass through the</p>	<p>sliding chutes, and are riveted with the pedal plate and the two elastic sheets. During riding of the bicycle, the substrate of the self-enclosed component is clamped on the pedal body through the inserting ports, the rivets move towards a shoe sole in the hollow sliding chutes when the pedal plate is pressed down by a foot, the elastic sheets on the shoe upper get close to the middle, and the foot can be fixed on the pedal by means of the self-enclosed component to prevent the foot from sliding laterally or falling on the pedal at a high riding speed or in a specific environment. The step-in self-enclosed pedal is convenient for better applying force through the foot to increase the riding speed, is convenient to install, and is scientific in structure.</p>	CN201420235312U	2014-05-05
		Publication	
		CN203902772U	2014-10-29
Assignee/Applicant			
Li Jin-xin, Dongying, Shandong, 257000, CN			



**Record 3. CRANK FOR BICYCLE AND METHOD FOR MANUFACTURING THE SAME**

Abstract	Application	
	Number	Date
<p>Disclosed is a method for manufacturing a crank for a bicycle by bonding structural members to each other with an adhesive comprising; a step for applying the adhesive in a line-like or dot-like form in correspondence with an intervention region of the adhesive; a step for disposing a fabric in correspondence with the intervention region of the adhesive; a step for expanding the adhesive applied in a line-like or dot-like form in the fabric; and a step for bonding the structural members to each other with the adhesive expanded in the fabric, and a crank for a bicycle manufactured by the method. When the crank for a bicycle is manufactured by bonding the structural members to each other with the adhesive, the adhesive can be applied easily at a high accuracy and a good repeatability, variations of application condition and amount of used adhesive can be suppressed, and variation in quality can be suppressed.</p>	TW2008144471A	2008-11-18
	Publication	
	Number	Date
	TWI411554B	2013-10-11
	Assignee/Applicant	
	Toray Industries   Shimano KK	

**Record 4. BICYCLE CHAIN WHEEL SET**

Abstract	Application	
	Number	Date
<p>The utility model relates to a bicycle chain wheel set comprising a substrate, a plurality of fixed parts, a first chain wheel and a second chain wheel. The substrate is provided with a cylinder-shaped body, a plurality of supporting arms extend out of the body periphery surfaces, and each supporting arm is provided with a first surface and a second surface. The first surface and the second surface are opposite. At least one through hole is formed in the each supporting arm. Each fixed part is provided with a major diameter portion. A long pin and a short pin respectively stretch out of the major diameter portion in a protruding mode. The short pin corresponding to the each fixed part is provided with a plurality of installation holes. Therefore, the first chain wheel can be connected with the short pin corresponding to the each fixed part. The second chain wheel corresponds to each through hole and is provided with a plurality of installation holes. By utilizing the direction of the long pin of the each fixed part, the second surface sequentially passes through the installation holes in the second chain wheel and the through holes in the supporting arms. Therefore, the second chain wheel is connected with the second surfaces of the supporting arms. Therefore, according to the bicycle chain wheel set, the number of the fixed parts is decreased so that convenience of assembling is improved and meanwhile intensity of an integral structure is maintained.</p>	CN201220394935U	2012-08-10
	Publication	
	Number	Date
	CN202765219U	2013-03-06
	Assignee/Applicant	
	Taiwan Weizhuan Co. Ltd., Taiwan, CN   Taiwan Weizhuan Co. Ltd., TW	

**Record 5. CHAINLESS BICYCLE**

Abstract	Application	
	Number	Date
<p>The present invention relates to a chainless bicycle, and the chainless bicycle according to the present invention comprises: a rotary disk having, at the central portion thereof, a first through hole to which a rotating shaft of a pedal is coupled, and a plurality of engagement openings provided outside the first through hole, the rotary disk being rotated by an external force of a user; a rotary gear engaged with one side of the rotary disk and rotated in a normal direction with respect to the rotation of the rotary disk; a rotary shaft connected with the rotary gear at one side, provided with a driven gear at the other side, and rotated by the rotary gear; and a driven part which is rotated by the rotary shaft, engaged with the driven gear, and rotated in the normal direction with respect to the rotation of the driven gear.</p>	WO2016KR3983A	2016-04-18
	Publication	
	Number	Date
	WO2017179750A1	2017-10-19
	Assignee/Applicant	
	Cho Kwang Hee, KR	

**Record 6. BICYCLE SPROCKET AND BICYCLE CRANK ASSEMBLY**

Abstract	Application	
	Number	Date
<p>A first sprocket is capable of engaging with a chain. The first sprocket has a first sprocket main body, a plurality of teeth disposed along a circumferential direction on the radially outer side of the first sprocket main body, and at least one shifting area. The teeth include at least one first tooth having a first maximum axial width and at least one second tooth having a second maximum axial width. The first maximum axial width is greater than the second maximum axial width. The first tooth is formed to be capable of engaging with an outer link plate of the chain. The second tooth is formed to be capable of engaging with an inner link plate of the chain.</p>	US14053630A	2013-10-15
	Publication	
	Number	Date
	US9701364B2	2017-07-11
	Assignee/Applicant	
	Shimano Inc., Osaka, JP   Shimano Inc., Sakai, Osaka, JP	

**Record 7. BICYCLE FRONT DERAILLEUR**

Abstract	Application	
	Number	Date
<p>A bicycle front derailleur includes a fixed member, a movable member, a chain guide and a linking member. The fixed member is coupled to a bicycle frame. The movable member is movably coupled to the fixed member. The chain guide is coupled to the movable member and extends in a first direction approximately parallel with a lengthwise direction of the bicycle frame. The linking member extends between the fixed member and the movable member and is configured to move the chain guide in a second direction relative to the fixed member between at least a first position and a second position, the first and second directions crossing with an angle there between of between 50 and 70 degrees.</p>	US2007651055A	2007-01-09
	Publication	
	Number	Date
	US20080167148A1	2008-07-10
	Assignee/Applicant	
	Shimano (Singapore) Pte. Ltd., Singapore, SG	



**Record 8. GEAR CHANGE OPERATION DEVICE FOR BICYCLE**

Abstract		Application	
<p><b>Problem to be solved:</b> To provide a gear change operation device having an operation member capable of certainly carrying out gear change operation.</p> <p><b>Solution:</b> This gear change operation device for the bicycle is furnished with an installation part 20, a winding-up lever, a releasing lever, a cable engaging body, a position holding mechanism and non-skid parts. The installing part is free to install on the bicycle. An operation member has operation surfaces and is installed on the installing</p>	part free to move. The cable engaging body is installed on the installing part free to move and a gear change cable is engaged with it. The position holding mechanism is supported on the installing part and holds the cable engaging body at a position in correspondence with a plurality of gear change positions in accordance with operation of the winding-up lever and the releasing lever. The nonskid part is provided of a material different from the operation member on the operation surface of the operation member.	Number	Date
	JP2006155531A	2006-06-05	
Publication		Number	Date
		JP2007320510A	2007-12-13
		Assignee/Applicant	
		Shimano Components Malaysia SDN BHD	

**Record 9. BICYCLE INNER TRANSMISSION AND MANUFACTURE METHOD THEREOF**

Abstract		Application	
<p>The invention relates to a bicycle inner transmission and a manufacture method thereof. The transmission mainly comprises a fixed star frame, front star wheels, back star wheels, a sun wheel, a pawl ring, a shell cylinder, a moving star frame, an active cylinder, a double gear ring, an eight-gear ring, and a gear shifting cylinder. a slow gear, a neutral gear and a fast gear are arranged. the front star wheels and the back star wheels are integrated wheel shaft members; the fixed star frame is a fixed part and is also used as a stationary sun wheel, and there are six front star wheels which are engaged with three back star wheels inside the frame; the sun wheel is engaged with the back star wheels and is provided with the pawl ring; the moving star frame is provided with four front star wheels and a pawl</p>	ring; the pawl ring is provided with a pawl milled with clutch teeth; the double gear ring is dynamically engaged with the eight gear ring for contrarotation gear shift and forward rotation transmission; the double gear ring is sleeved by the gear shifting cylinder to form an integrated part; the eight gear ring is sleeved by the active cylinder to form an integrated part and then is provided with a common chain wheel; power is transferred from the active cylinder and the eight gear ring to drive the double gear ring to the pawl ring through the gear shifting cylinder, and if the gear shifting cylinder is engaged with the sun wheel pawl ring, it is the slow gear; if the gear shifting cylinder is engaged with the moving star frame pawl ring, it is the fast gear; non engagement is the neutral gear.	Number	Date
	CN201510403590A	2015-07-12	
Publication		Number	Date
		CN106335595A	2017-01-18
		Assignee/Applicant	
		Li Jian-wei, Shenzhen, Guangdong, CN	

**Record 10. DOUBLE-DRIVE PEDAL BICYCLE**

Abstract		Application	
<p>The utility model relates to a double-drive pedal bicycle, which is characterized in that a backrest seat is arranged above a rear wheel of the bicycle, two ends of a front support are respectively and fixedly provided with a left bearing and a right bearing, a left pedal and a right pedal are respectively and fixedly arranged on the upper ends of a left lever and a right lever, the lower ends of the left lever and the right lever are respectively connected with the left bearing and the right bearing, the left lever and the right lever</p>	are respectively connected with a left directional flywheel and a right directional flywheel on a middle shaft through a left drive chain and a right drive chain, the middle shaft is fixedly provided with a large chain disc, and the large chain disc is connected with the rear wheel through a drive chain. The double-drive pedal bicycle conforms to the physiological curve of a human body, and is suitable for the growth of the human body, comfortable to sit, labor-saving, fast, flexible and safe.	Number	Date
	CN201220062916U	2012-02-25	
Publication		Number	Date
		CN202439814U	2012-09-19
		Assignee/Applicant	
		Nong Wei-ming, Nanning, Guangxi Zhuang Autonomous Region, 530409, CN	

**Record 11. DOUBLE-FLYWHEEL BICYCLE**

Abstract		Application	
<p>The utility model relates to a double-flywheel bicycle. People do not feel tired when riding the double-flywheel bicycle. The bicycle comprises wheels, a frame, flywheels, chains, a steel wire rope, a pulley, pedals and a shaft, wherein the frame is connected with the shaft; the two ends of the shaft are movably connected with left and right pedals; the left and right pedals are connected with one end of a left chain and one end</p>	of a right chain; the left and right chains surround the two flywheels on the two sides of a rear wheel; the other ends of the two chains are connected with the two ends of the steel wire rope which surrounds the pulley; and the pulley is fixed on the frame. People feel comfortable and do not feel tired only through linear motion when riding the double-flywheel bicycle, and speed can be improved.	Number	Date
	CN201220714857U	2012-12-10	
Publication		Number	Date
		CN203005675U	2013-06-19
		Assignee/Applicant	
		Che Jin-sui, Shaoxing, Zhejiang, 312000, CN	

**Record 12. BICYCLE PEDAL**

Abstract		Application	
<p>Bicycle pedal comprising a pedal axle for connection to a crank of a bicycle, a pedal body comprising at least one actuation surface for actuating the pedal, and connection means. The connection means connect the pedal body to the pedal axle, such that the pedal body, while cycling, can freely rotate with respect to the</p>	pedal axle about a first axis (A1) extending substantially parallel to the pedal axle, and a second axis (A2) extending substantially perpendicular to the pedal axle and substantially parallel to the actuation surface, and wherein the second axis (A2) is located at a distance from, and in use above, the actuation surface.	Number	Date
	EP2008873964A	2008-12-05	
Publication		Number	Date
		EP2282928B1	2015-04-15
		Assignee/Applicant	
		3ax B.V., 1489 NC de Woude, NL, 101507052	

**Record 13. BICYCLE PEDAL WITH TRIANGLE SECTION**

Abstract	Application	
	Number	Date
<p>The utility model discloses a bicycle pedal with a triangle section. The bicycle pedal is triangle-shaped, the triangle-shaped pedal is provided with an installing hole for installing a bicycle pedal shaft, the installing hole is arranged on the face opposite to one of the drift angles, and the triangle-shaped pedal is shaped as an equilateral triangle. The bicycle pedal with triangle section has great strength, simple structure and novel design; by injecting and forming with hard plastic, the bicycle pedal is easy to manufacture, material saving and good at energy saving; furthermore, the bicycle peddle is easy to install, so it is suitable for various bicycles to install and use as well as brings lots of convenience to peoples lives.</p>	CN200920286381U	2009-12-25
	Publication	
	Number	Date
	CN201678010U	2010-12-22
	Assignee/Applicant	
	Foreign Language School of Shanghai Normal University, CN	

**Record 14. BICYCLE DRIVING APPARATUS USING A THIGHS**

Abstract	Application	
	Number	Date
<p>The present invention relates to a bicycle driving apparatus using thighs, comprising: a leg post having a pair of supporting shafts, and installed on a post holder; a pair of push pads coupled to the supporting shafts to be rotated reciprocally by a moving force of the thighs of a rider, and provided with an attachment portion to fixate the thighs portion; and a driving force transferring unit to transfer a driving force of the push pads to a wheel driving force. As such, the present invention allows a rider to drive the bicycle using the reciprocal movement of the push pads supporting the thighs of the rider while maintaining a riding position of a conventional bicycle, with effects of improving an exercise result by using muscles which were not previously used, and relieving pains on a prostate part during the riding, capable of being applied to improve the structure with a reduced accident probability during the riding.</p>	KR201519329A	2015-02-09
	Publication	
	Number	Date
	KR2016097543A	2016-08-18
	Assignee/Applicant	
	Catholic University of Daegu Industry Academic Cooperation Foundation, KR	

**Record 15. SIDESLIP BICYCLE FRONT GEAR WARE**

Abstract	Application	
	Number	Date
<p>The utility model provides a sideslip bicycle front gear ware, include the casing, grab handle, steel cable, pivot and serving spare, and pass the handlebar pole of derailleur, grab a rigid coupling in on the casing, serving spare sets up the casing with grab between the handle, rope connection in on the serving spare, its characterized in that: the pivot rotate connect in in the casing, just the pivot drives serving spare rotates, be provided with screw-nut in the pivot, be provided with the lead screw section on the handlebar, in order to realize the derailleur is followed in the time of handlebar pole axial displacement, the pivot takes place to rotate, and then drives serving spare rotates. Accessible lateral sliding derailleur changes speed.</p>	CN201620255940U	2016-03-25
	Publication	
	Number	Date
	CN205524794U	2016-08-31
	Assignee/Applicant	
	Ningbo Qilong Vehicle Industry Co. Ltd., Cixi, Zhejiang, 315322, CN	

**Record 16. LIGHTWEIGHT BICYCLE PEDAL**

Abstract	Application	
	Number	Date
<p>The utility model relates to a lightweight bicycle pedal, which comprises a pedal mandrel and a pedal body. A first rotating assembly is assembled between the inner side end of the pedal mandrel and a shaft hole of the pedal body, a second rotating assembly and a third rotating assembly which can be used as bearings are arranged between the outer side end of the pedal mandrel and the shaft hole of the pedal body, an inner ring inside wall and an outer ring outside wall of the second rotating assembly are respectively abutted and limited via inside wall surfaces of a limiting wall at the outer side end of the pedal mandrel and a limiting wall inside the shaft hole at the outer side end of the pedal body, an outer ring inside wall of the third rotating assembly is abutted and limited via an outside wall surface of the limiting wall of the pedal body, and an inner ring outside wall of the third rotating assembly is abutted and packed via a block nut at the outer side end of the pedal mandrel. The outer side end of the shaft hole is not required to be provided with conventional outer thread and a screwing end cover so that the thickness of the wall of the shaft hole can be reduced, and the two bearings can increase load bearing strength and shorten length of the pedal mandrel, thereby integrally meeting a lightweight requirement.</p>	CN201020176690U	2010-04-06
	Publication	
	Number	Date
	CN201670330U	2010-12-15
	Assignee/Applicant	
	Bikeforce International Co. Ltd., CN	

**Record 17. HYDRAULIC POWER-ASSISTED BICYCLE**

Abstract	Application	
	Number	Date
<p>A hydraulic power-assisted bicycle adopts the structure that the upper end of a rear wheel slanting bracket of a bicycle is inserted into two ears of a bow beam, so as to penetrate through a connecting axis lever, and the upper end of the slanting bracket can be positioned in the two ears of the bow beam and can rotate freely; one end of a bottom horizontal bracket is connected to a hydro cylinder, and the other end of the hydro cylinder is connected with the bow beam; and a hydraulic transmission device is mounted on an axle sleeve on the left side of the rear wheel of the bicycle. By adopting the structure, when a rider rides the bicycle, the generated pressure to the bicycle is uncertain, so that the hydro cylinder with a return spring mounted therein generates reciprocating movement, to press hydraulic oil in the hydraulic transmission device to cause the rotation of the hydraulic transmission device, thereby playing a power-assisted role to the bicycle; and when the road is smooth, the piston rod in the hydro cylinder generates smaller strokes, so that the hydraulic oil pressed in the hydraulic transmission device is less, and no assisted power is generated to the bicycle; however, the cylinder bore and the logarithm of the hydro cylinder can be changed to obtain hydraulic oil with adequate volume to impulse the hydraulic transmission device.</p>	CN200920168675U	2009-07-28
	Publication	
	Number	Date
	CN201530458U	2010-07-21
	Assignee/Applicant	
	Bao Cui-lai, CN	





#### Record 18. SPEED CHANGING STRUCTURE OF BICYCLE

Abstract	Application	
	Number	Date
<p>The utility model discloses a speed changing structure of a bicycle. The speed changing structure of the bicycle comprises a front gear disc which is driven by pedals and an axle which is fixed in a rear wheel and further comprises a speed changing disc and a supporting rod, wherein the connecting line between the central point of the front gear disc and the central point of the axle is overlapped with the supporting rod, the speed changing disc is fixed on the supporting rod and in the center of the supporting rod, the inner periphery of the speed changing disc is connected with the front gear disc through a chain, and the outer periphery of the speed changing disc is connected with the axle through the chain. The front gear disc, the speed changing disc and the axle are the same size, a high advancing speed can be obtained after the speed of the bicycle is changed through the speed changing structure of the bicycle, and therefore speed changing efficiency is effectively improved.</p>	CN201320121253U	2013-03-18
	Publication	
	Number	Date
	CN203246560U	2013-10-23
	Assignee/Applicant	
	Li Jia-jun, Taizhou, Zhejiang, 201620, CN	

#### Record 19. BICYCLE WITH AUTOMATIC GEAR SHIFTING

Abstract	Application	
	Number	Date
<p>Invention relates to control of automatic gear shifting of the bike with the help of centrifugal force of rotating loads with the following connection of add-on effort from rotating wheel plug from rare gear shifting actuation. Buckle plate of stars is spaced concerning centrifugal loads on different wheel plugs. Cable of rare gear shift control passes through motionless axle of plug attachment of front wheel and along the bicycle frame. At that half coupling, passing add-on effort from the plug of rotating wheel directly connected with cable of gear shift. Technical decision is directed on removal of mutual gage restriction of stars and loads, which provides bigger motion of centrifugal loads and greater number of stars in buckle plate.</p>	RU2006131666A	2006-09-05
	Publication	
	Number	Date
	RU2327593C1	2008-06-27
	Assignee/Applicant	
	Aleshin Vladislav Petrovich	

**Effect:** Simplification of construction, widening of possible values of transmission ration in chain gear, gain in sensitivity to speed changing.

#### Record 20. DRIVE BOOSTER

Abstract	Application	
	Number	Date
<p><b>Problem to be solved:</b> To solve the problem wherein a conventional bicycle must be constantly pedalled while running, precluding the reduction of the load on the legs for constantly pedalling.</p> <p><b>Solution:</b> A plate-like bar with a rolling shaft being mounted on its end and a crank with a groove formed in its end are faced to each other by a series of operations from a rotary shaft to a rotary shaft, the rolling shaft is fitted to the groove, and moved on a side face of the groove in a rolling manner. Thus, the rolling shaft can be rotated by the temporary lever action.</p>	JP201067331A	2010-03-24
	Publication	
	Number	Date
	JP2011195128A	2011-10-06
	Assignee/Applicant	
	Akutsu Nobuyuki	

#### Record 21. BICYCLE WITH FRONT WHEEL AND REAR WHEEL TURNING DIRECTION SYNCHRONOUSLY

Abstract	Application	
	Number	Date
<p>The utility model relates to a half lying type two-wheel bicycle. The bicycle is composed of a bicycle frame, a front bicycle fork, a rear bicycle fork, a handlebar, a pull rope, handles, a seat, a cowl, a cargo tank, a front wheel, a rear wheel, foot pedals, a crank, a coaxial speed increasing and changing free hub and the like. The front bicycle fork, the rear bicycle fork and the handlebar are mounted at the two ends and the middle of the bicycle frame respectively and can rotate on the bicycle frame. The pull rope is used for connecting the bicycle forks and the handlebar, in the direction turning process, the torque of the handlebar is transmitted to the front bicycle fork and the rear bicycle fork by the pull rope, and therefore the front wheel and the rear wheel simultaneously rotate in the reverse direction. The foot pedals, the crank, the coaxial speed increasing and changing free hub are mounted on the front wheel, and the front wheel is a driving wheel of the bicycle. The cowl, the streamline-shaped cargo box and a half-lying type riding mode reduce air resistance and meanwhile increase the comfort level of riding. Accordingly, the bicycle is simple and concise in structure, flexible in direction turning, and most suitable for long riding.</p>	CN201320676181U	2013-10-31
	Publication	
	Number	Date
	CN203544275U	2014-04-16
	Assignee/Applicant	
	Cheng Da-peng, Suzhou, Anhui, 234000, CN	

#### Record 22. LEVER-TYPE MANPOWER BICYCLE TRANSMISSION SYSTEM

Abstract	Application	
	Number	Date
<p>The utility model belongs to the technical field of manpower transportation tools, in particular relates to a lever-type manpower bicycle transmission system. The lever-type manpower bicycle transmission system is provided with two levers, wherein each lever is provided with a footboard, the tail end of each lever is respectively provided with a chain, the two chains are connected with two ends of a traction rope after bypassing a flywheel, the traction rope bypasses a traction pulley and is tensioned, the flywheel is installed on a flywheel shaft, a forward chain wheel, a clutch and a first reversing gear are sequentially installed on the flywheel shaft, the forward chain wheel is connected with a driving wheel shaft through the chain, the first reversing gear is engaged with a second reversing gear which is installed on a reversing shaft, a reversing chain wheel is installed on the reversing shaft, and the reversing chain wheel is connected with the driving wheel shaft through the chain. The lever-type manpower bicycle transmission system has beneficial effects that a simple, reliable and economical structure is used for substituting the function of an original speed changing box, so that the weight of the lever-type manpower bicycle is reduced, the cost is reduced, and the product is convenient to popularize.</p>	CN201420516845U	2014-09-10
	Publication	
	Number	Date
	CN204096028U	2015-01-14
	Assignee/Applicant	
	Chen Zhi-fa, Yulin, Shanxi, 718600, CN	



#### Record 23. A VARIABLE LENGTH CRANK-ARM BASED DRIVE SYSTEM

Abstract	Application	
	Number	Date
<p>A slidingly variable length crank arm assembly for particular use in manually driven vehicles including a slidably extendable crank arm provision to effect a selective change of length of the pedal arm during its rotary motion and in the process adapted such that the torque generated by the pedal-crank assembly of the invention is significantly multiplied to nearly two times the torque generated from conventional pedal-crank system involving arms of fixed and equal lengths ensuring that</p> <p>movement of the foot of the driver while using, the slidingly variable length crank assembly is maintained in circular path, for example, in case of bicycle the driver's foot moves in the same circular path as in comparable fixed length crank assembly. A simple and cost effective manner of improving the torque generated through pedal-crank systems which would favour diverse and efficient application of such pedal-crank systems in variety of mechanically driven subjects.</p>	-	2009-02-13
	Publication	
	Number	Date
	WO2009101637A3	2010-10-28
	Assignee/Applicant	
	Mondal Manoj Kumar, IN	

#### Record 24. FRONT-WHEEL DRIVING BICYCLE

Abstract	Application	
	Number	Date
<p>The utility model relates to a front-wheel driving bicycle. The bicycle comprises a bicycle frame, a front branch part, a front shaft and a hub on the front shaft supported by a rolling bearing, wherein a driving device with gear transmission as well as a pedal mechanism and a saddle connected with the driving device are mounted on one side of the hub of the front shaft of the front branch part. The bicycle is characterized in that the saddle adopts a back-and-forth push-pull saddle structure which comprises a stand pipe assembly structure, a bearing plate and a slide plate, wherein the manger-shaped bearing plate is fixed on the stand pipe assembly structure of the bicycle frame,</p> <p>and the slide plate fixed and integrated with the bottom of the saddle is connected with the bearing plate in a sliding manner. The utility model has the beneficial effects that the improved saddle can be adjusted back and forth in a push-pull manner, so that riders at different heights can comfortably sit on the saddle with the back abutting against a saddle back; and a rear-wheel driving device is transformed into a front-wheel driving device according to human engineering theories, and by use of the saddle back, a rider sitting on the saddle can exert the force through the movement of the whole body while pedalling, thereby achieving more labour-saving riding.</p>	CN200920096495U	2009-04-24
	Publication	
	Number	Date
	CN201432759Y	2010-03-31
	Assignee/Applicant	
	Peng Wei-le, Tianjin 300401, CN	

#### Record 25. TRANSMISSION WITH INTERNAL PROTECTIVE SHIELD AND BICYCLE INCORPORATING SAME

Abstract	Application	
	Number	Date
<p>A transmission includes a ball spline mechanism having an outer member which can rotate integrally with an inner member by means of balls housed in guide grooves and which can move in the axial direction; and a derailleur which shifts a chain wrapped around a first sprocket moving integrally with the outer member from one transmission sprocket to another among a plurality of operating sprockets. The inner member and the outer member include guide surfaces through which the outer member is guided to move in the axial direction through the balls. The outer member is provided with a dust cover for covering the guide surfaces, regardless of the axial position of the first sprocket.</p>	US2005236705A	2005-09-27
	Publication	
	Number	Date
	US7503862B2	2009-03-17
	Assignee/Applicant	
	Honda Motor Co. Ltd., Tokyo, JP	

#### Record 26. FORWARD DRIVING FOR BICYCLE

Abstract	Application	
	Number	Date
<p><b>Purpose:</b> A forward driving bicycle is provided to improve speed of the bicyclist by transferring driving force to a rear wheel through a chain and to offer excellent exercise effects.</p> <p>The frame, having a sleeve, supports a front wheel, a rear wheel and a handle. One end of the shaft is combined on a sprocket wheel delivering torque to the rear wheel. The ratchet wheel is protruded to a saw tooth shape. The foot holder is separated from a surface of a pedal. The torque of the crank is delivered to the crankshaft.</p>	KR2007127337A	2007-12-10
	Publication	
	Number	Date
	KR2009060504A	2009-06-15
	Assignee/Applicant	
	An Sang Hun	

#### Record 27. PROPULSION APPARATUS FOR HUMAN POWERED VEHICLES AND MACHINES

Abstract	Application	
	Number	Date
<p>The present invention provides a propulsion apparatus for human powered vehicles and machines. The propulsion apparatus is powered by exerting a force (such as the operator's weight) onto the foot pedals in a reciprocating fashion. It is comprised of two ratcheting arm foot pedals which transfer a high torque and low speed input to the output axle; transmission elements for shifting the displacement of one arm foot pedal into an equal and opposite displacement of the other one; and an arrangement of gears and ratcheting crank arms which convert the alternating motion into rotational motion and transfers a low torque and high speed input to the output axle. The high torque low speed input engages when the output axle slows down to a certain speed and the low torque high speed input is engaged until the output axle reaches a certain speed in order to achieve and maintain an overall good average torque and speed in the output axle.</p>	CA2832547A	2013-11-12
	Publication	
	Number	Date
	CA2832547A1	2015-05-12
	Assignee/Applicant	
	Acevedo Hector H. A., Calgary, CA	

**Record 28. BICYCLE OPERATING DEVICE**

Abstract		Application	
		Number	Date
A bicycle operating device is provided with a position maintaining arrangement that selectively maintains a movable member in any one of a plurality of holding positions relative to a fixed member. The moving arrangement selectively moves the movable member in a first moving direction from a current holding position to another one of the plurality of holding positions. The first operating member moves in a first operating direction from a rest position to a first end position, and moves in a second operating direction from the rest position to a second end position. The movable member is moved by a different number of the holding positions in the first moving direction when the first operating member moves from the rest position to the first end position as compared to when the first operating member moves from the rest position to the second end position.		US13251241A	2011-10-01
	Publication		Number
		US20130081507A1	2013-04-04
		Assignee/Applicant	
		Shimano Inc., Osaka, JP   Fukao Kazutaka, Osaka, JP   Watarai Etsuyoshi, Osaka, JP   Kosaka Kentaro, Osaka, JP	

**Record 29. EXTENSIBLE PEDAL**

Abstract		Application	
		Number	Date
Provided is an extensible pedal which belongs to transportation media and mainly solves problems that the bicycle pedal is too short and is easy for users to slip on rainy days. The extensible pedal comprises a rotating shaft and a pedal and is characterized in that the pedal consists of a front pedal and a back pedal which are connected together through two parallel supporting rods fixed on the rotating shaft; and the supporting rods are plugged into the corresponding holes of the front pedal and the back pedal, and an extroverse retaining edge is arranged at an edge of the front pedal. During usage, the length of the pedal can be adjusted according to sizes of user's feet. In adjustment, the front pedal and the back pedal can be moved forward and backward along the supporting rod when being pulled by hands. The plastic retaining edge at the rim of the front pedal can play certain anti-skidding effects on rainy days.		CN201120004265U	2011-01-08
	Publication		Number
		CN201932319U	2011-08-17
		Assignee/Applicant	
		Yuan Bei, Binzhou, Shandong, CN	

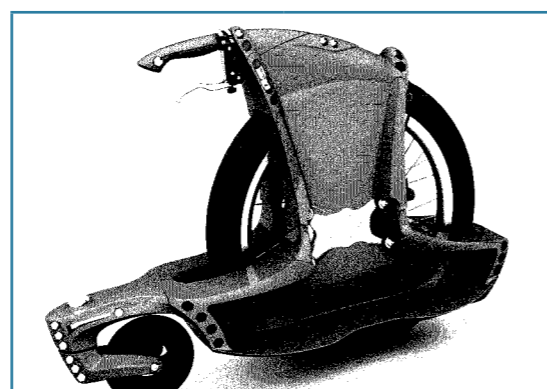
**Record 30. BICYCLE PEDALLING POWER MECHANISM**

Abstract		Application	
		Number	Date
A bicycle pedalling power mechanism mainly comprises a swing device and a connecting device; the swing device is provided with a swing lever and a one-way rotating part, the swing lever is provided with a plurality of chutes and a penetrating groove, and the one-way rotating part is connected with the swing lever and a fluted disc; and the connecting device comprises a connecting plate, a pedalling bearing arranged on the connecting plate and two bearing sets, a bicycle pedal rotating shaft penetrates the pedalling bearing and is then fixedly connected to a crank shaft, the two bearing sets are arranged on the connecting plate in a non-coaxial manner and are arranged in the chutes of the swing lever side by side, and the connecting plate is positioned in the penetrating groove. Therefore, the feeling of pause and transition during pedalling can be avoided, so as to improve the stability.		CN201120125415U	2011-04-26
	Publication		Number
		CN201999161U	2011-10-05
		Assignee/Applicant	
		Helun Co. Ltd., Taiwan, CN	

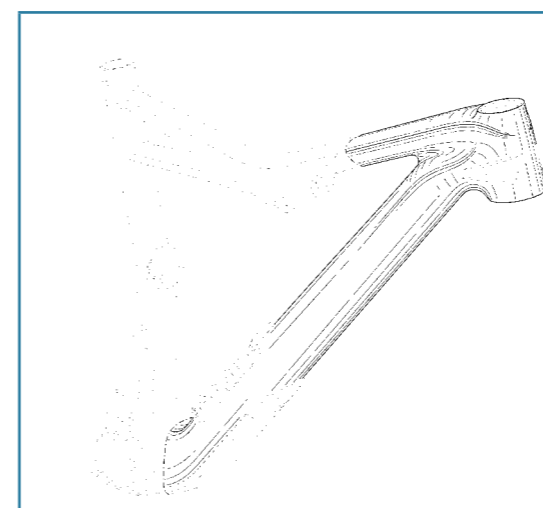
## Annexure 6. Bibliographic details of representative Industrial Design Registrations



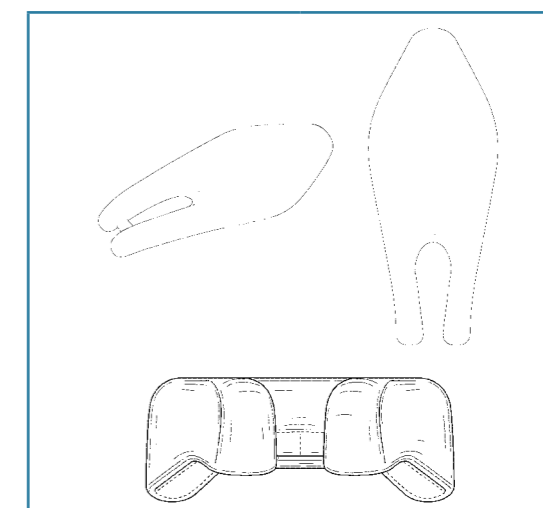
Design Registration	
No.	Date
DM/078325	2012-05-10
Design Holder	Product Description
Audi AG	Bicycles, wheel rim
Source	Designation
Hague	CH,EM



Design Registration	
No.	Date
D0691926	2013-10-22
Design Holder	Product Description
Soma Gabor Ungar	Cycle
Source	Designation
USID	US



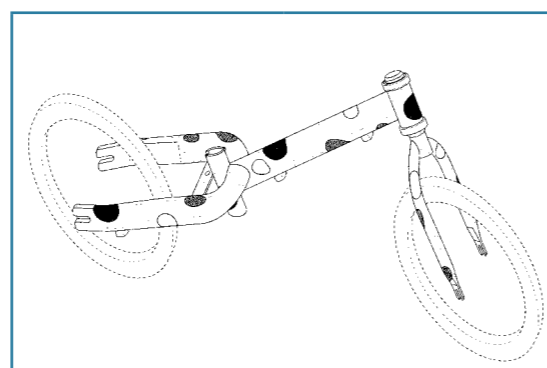
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No.	Date
D0766136	2016-09-13
Design Holder	Product Description
Specialized Bicycle Components Inc.	Bicycle Frame
Source	Designation
USID	US



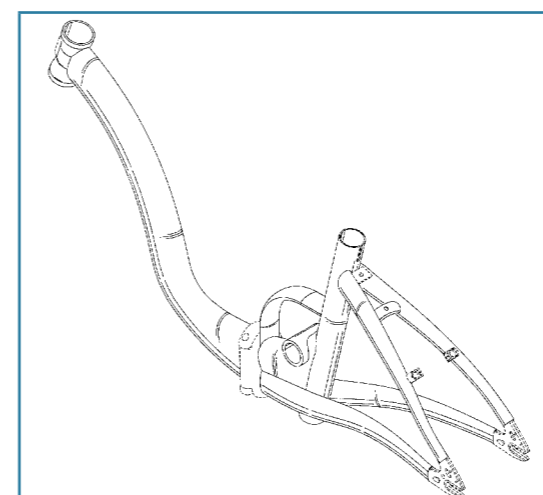
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No.	Date
D0756675	2016-05-24
Design Holder	Product Description
Tampa Bay Recreation LLC.	Bicycle Seat
Source	Designation
USID	US



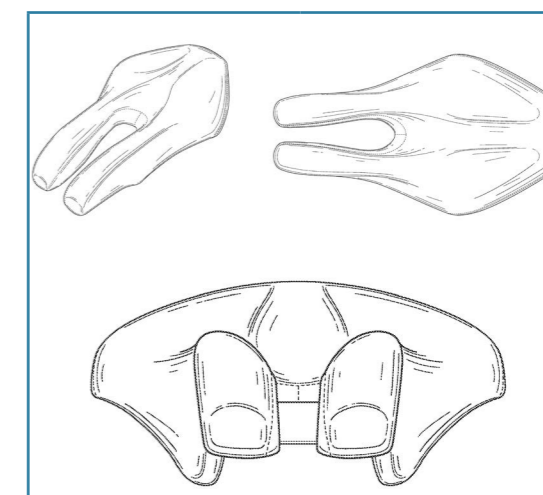
Design Registration	
No.	Date
DM/079449	2012-09-11
Design Holder	Product Description
Fleissner & Partner St. Gallen AG	Electric Bicycle
Source	Designation
Hague	CH



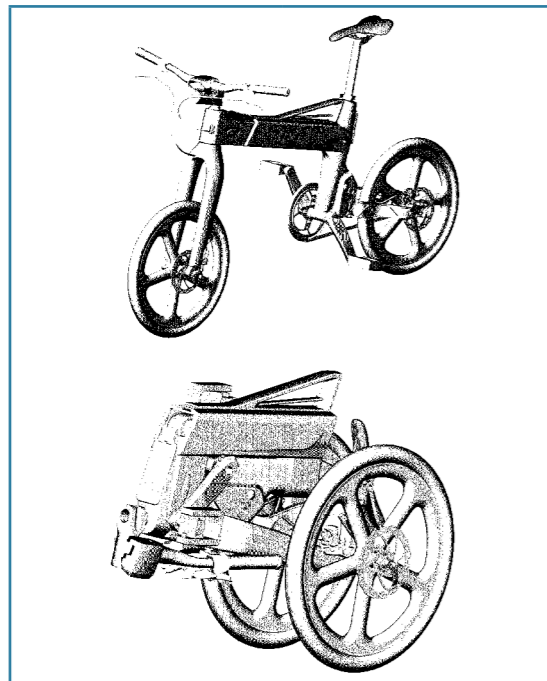
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D0725553	2015-03-31
Design Holder	Product Description
Frogbikes Ltd.	Bicycle Frame
Source	Designation
USID	US



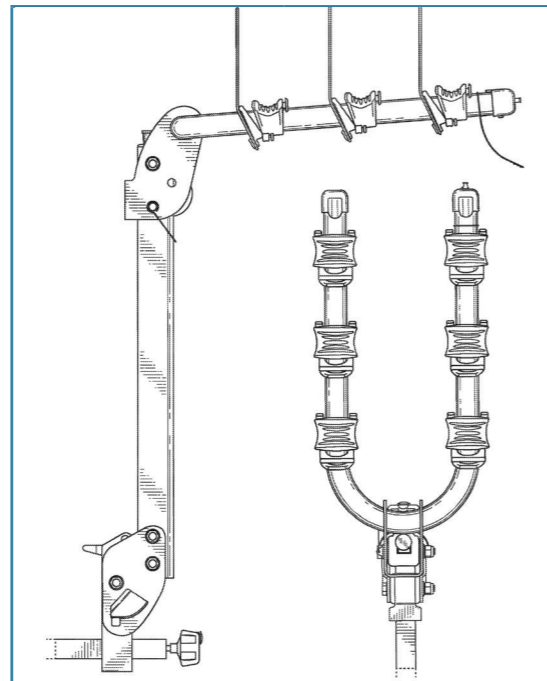
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D0690239	2013-09-24
Design Holder	Product Description
Joakim Uimonen	Bicycle Frame
Source	Designation
USID	US



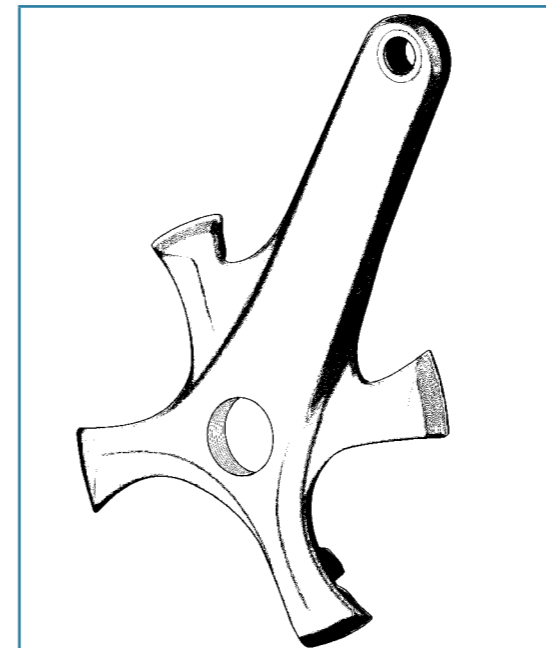
Design Registration	
No.	Date
D0639081	2011-06-07
Design Holder	Product Description
Steve G. Toll	Bicycle Seat
Source	Designation
USID	US



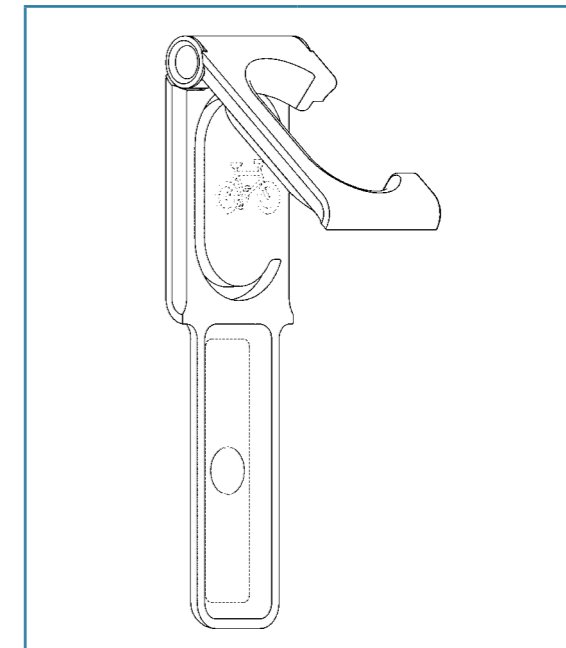
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D0756264	2016-05-17
Design Holder	Product Description
Ford Motor Company	Folding Bicycle
Source	Designation
USID	US



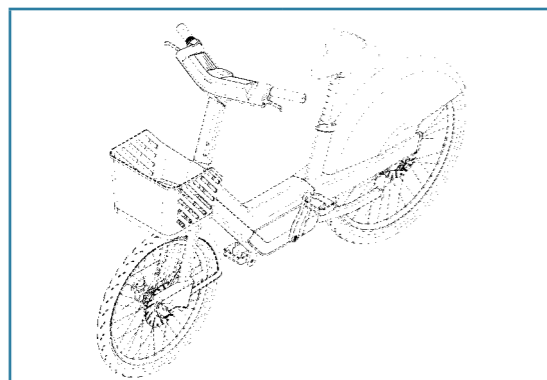
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Design Holder	Product Description
Joseph Flaherty	Bicycle Carrier Rack
Source	Designation
USID	US



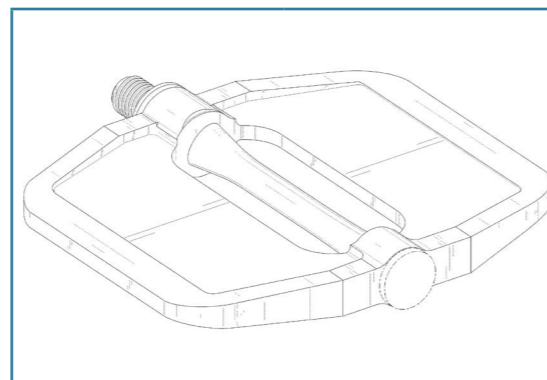
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D0756271	2016-05-17
Design Holder	Product Description
Campagnolo S.R.L.	Bicycle Pedal Crank
Source	Designation
USID	US



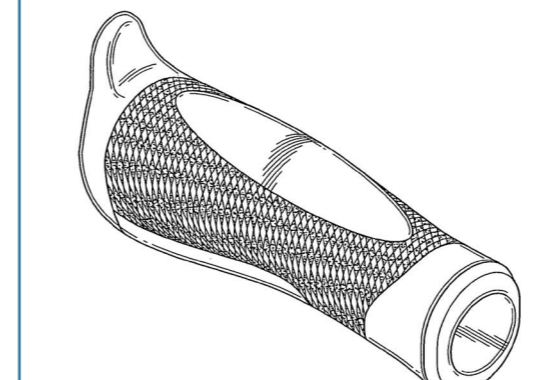
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Design Holder	Product Description
Andrew Lang Product Design Limited	Wall Mount Bicycle Stand
Source	Designation
USID	US



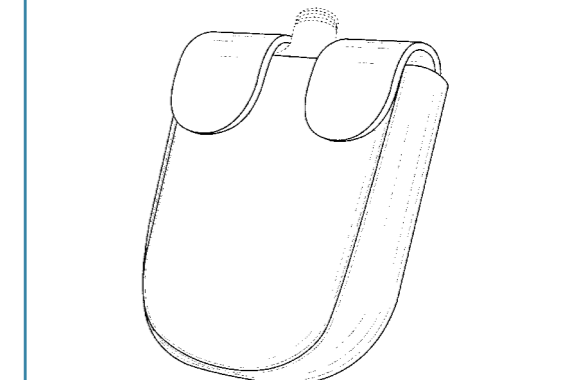
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D0738276	2015-09-08
Design Holder	Product Description
Bewegen Technologies Inc.	Bicycle Handlebar
Source	Designation
USID	US



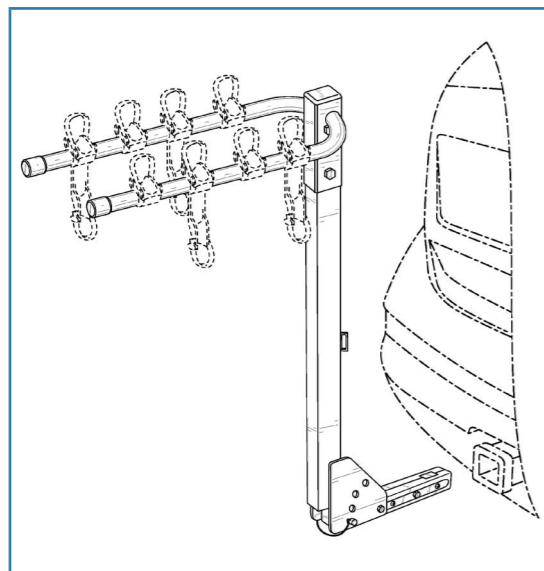
Design Registration	
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D0615003	2010-05-04
Design Holder	Product Description
Christopher Canfield	Bicycle Pedal
Source	Designation
USID	US



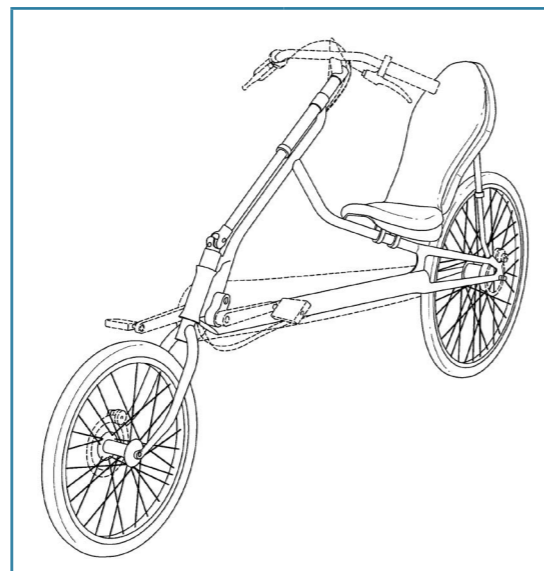
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D0565384	2008-04-01
Design Holder	Product Description
Ming Chang Chen	Bicycle Handlebar Grip
Source	Designation
USID	US



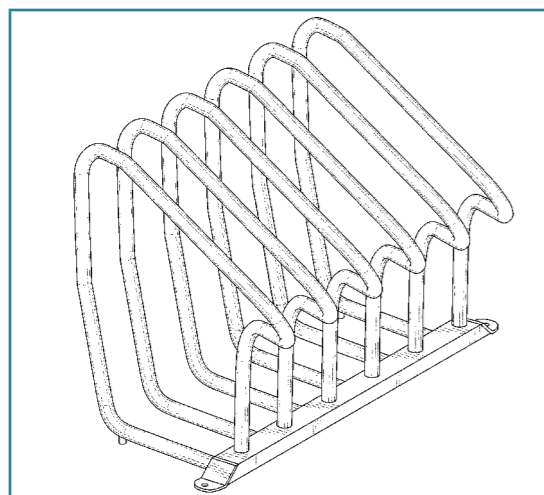
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D0721619	2015-01-27
Design Holder	Product Description
Walter Douglas Armstrong	Pedal Cover
Source	Designation
USID	US



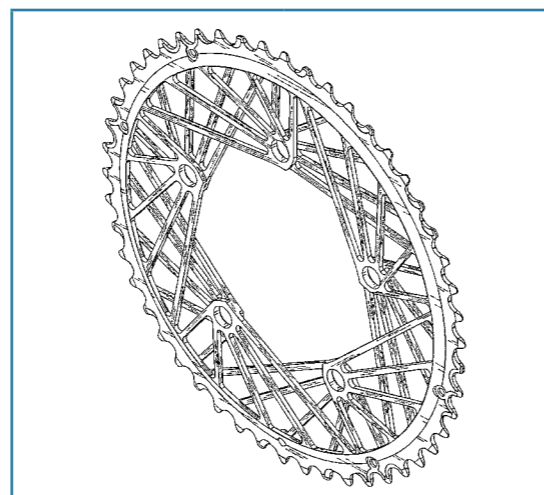
Design Registration	
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Do632636	2011-02-15
Design Holder	Product Description
Robert Farber	Hitch Mount Bicycle Carrier
Source	Designation
USID	US



Design Registration	
No.	Date
Do619050	2010-07-06
Design Holder	Product Description
John Irvn Tolhurst	Recumbent Bicycle
Source	Designation
USID	US



Design Registration	
No.	Date
Do719491	2014-12-16
Design Holder	Product Description
Northwest Sportworks Inc.	Bicycle Rack
Source	Designation
USID	US



Design Registration	
No.	Date
Do728432	2015-05-05
Design Holder	Product Description
Chang Hui Lin	Sprocket Wheel for Bicycle
Source	Designation
USID	US

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