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(73) Patenthaver: **SEW-EURODRIVE GmbH & Co. KG, Ernst-Blickle-Strasse 42, 76646 Bruchsal, Tyskland**

(72) Opfinder: **MAHLEIN, Jochen, Ruschgraben 45, 76139 Karlsruhe, Tyskland**
EGGER, Björn, Engelsgasse 10, 76646 Bruchsal, Tyskland
SCHNEIDER, Bernhard, Wilhelmstraße 43, 68794 Oberhausen-Rheinhausen, Tyskland

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

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Description

The invention relates to an arrangement for attaching a vehicle.

Vehicles with a locking unit are known. In particular, it is known in the case of bicycles to pass a locking means through the spoke region of a wheel in order to produce an immobilising means.

An inductive charging system for a battery of a bicycle which engages on the handlebar is known from EP 0 741 441 A2.

Charging of a battery of a bicycle, wherein a charging cable is guided to a box fastened on the handlebar, is known from JP 2006 109574 A.

A storage system for bicycles which are charged in the storage system is known from US 2008/297108 A1.

Likewise a charging system is known from JP 5 316606 A.

A charge coupling for an electrically operable vehicle is known from US 5 816 643 A.

A flexible locking member is known as closest prior art from GB 2 154 316 A.

The object of the invention is therefore to refine an arrangement for attaching a vehicle, with particularly simple and secure operation being made possible.

According to the invention, this object is achieved in the case of the arrangement for attaching a vehicle in accordance with the features set forth in Claim 1.

Important features of the invention in the case of the arrangement for attaching a vehicle are that the arrangement for attaching a vehicle is provided on a stationarily arranged means,

wherein a locking unit is arranged on the vehicle, which unit can be connected in positive manner to a locking part which is connected to the stationarily arranged means by means of a flexible line,

wherein

the locking part comprises means for energy transmission, in particular transmission of electrical energy.

What is advantageous in this case is that thus on one hand simple and secure operation when attaching is achieved and furthermore charging of the vehicle is made possible. Additionally, the electrical connection also introduces the supplying of electrical consumers, such as electric heating devices for heating the energy store and/or the locking unit.

In one advantageous configuration, the flexible line comprises at least one electrical line. What is advantageous in this case is that an integrated line can be embodied which thus makes at least two functions, i.e. the mechanical connection and electrical supplying, able to be performed without further means being necessary.

In one advantageous configuration, electrical contacts are used as means for energy transmission, in particular with the locking part for this purpose having on its outer surface electrical contact faces which can be contacted by contacting means of the vehicle which are arranged in the vehicle. What is advantageous in this case is that as high as possible an efficiency in transmission can be achieved. For the losses are limited substantially to the ohmic losses if the contact resistance is negligible. Furthermore, transmission of direct current to the vehicle is made possible, as a result of which direct charging and also direct control of the charging current is made possible.

In one advantageous configuration, the charging current for the energy store is able to be conducted by means of first contacting means, in particular by means of two. What is advantageous in this case is that two lines suffice for supplying charging current.

In one advantageous configuration, further contacting means are provided for conducting conducted signals for data transmission. What is advantageous in this case is that further lines can be provided for data transmission purposes. Thus for example the value of a physical variable, such as for example charging condition or temperature, can be transmitted.

In one advantageous configuration, a secondary winding arranged in the vehicle is provided as means for energy transmission, which winding can be inductively coupled to a primary winding which is encompassed by the locking part and is supplied via the flexible line. What is advantageous in this case is that contactless transmission which operates substantially without disruption even in the case of soiling or icing-up is made possible. In the wet too, the charging can be carried out without significantly impairing the efficiency. Furthermore, no further galvanic isolation between the vehicle and charging station is necessary.

In one advantageous configuration, an infeed device injects an alternating current into the primary winding, with a capacitor being connected to the secondary winding in series and/or in parallel such that the associated resonant frequency corresponds substantially to the frequency of the injected alternating current. What is advantageous in this case is that a power source which operates with a frequency of between 10 and 500 kHz, preferably with a frequency of between 10 and 30 kHz, can be used. Owing to the resonant transmission, the efficiency is insensitive to deviations from the optimum coupling strength between the primary winding and secondary winding.

According to the invention, the locking part is used as an immobilising means and/or turning lock for a wheel, wherein the locking part penetrates through the spoke region of a wheel of the vehicle. What is advantageous in this case is that the locking part has not only the function of the immobilising means but also the function of the turning lock.

In one advantageous configuration, the locking unit of the vehicle is arranged on a first side of a wheel of the vehicle and the locking part in the state connected to the locking unit penetrates at least partially through a cutout in a further unit, with the wheel being

provided between this further unit and the locking unit. What is advantageous in this case is that the locking part is mounted at two points, between which the spoke region of the wheel is arranged. Thus a rotary movement of the wheel can be prevented in stabilised manner, i.e. large forces, in particular reaction forces, can be brought to bear in order to prevent the rotary movement.

In one advantageous configuration, the flexible line has a steel wire mesh or hardened steel sleeves. What is advantageous in this case is that the charging cable is cut-resistant.

In one advantageous configuration, at least two electrical lines spaced apart from each other are provided within the steel wire mesh. What is advantageous in this case is that the electrical lines are conducted within the cut protection means. In the case of a coaxial embodiment of the lines, alternating currents can also be conducted without particular losses.

In one advantageous configuration, the flexible line has a rotationally symmetrical and/or coaxial construction. What is advantageous in this case is that high frequencies can be conducted without particular losses.

In one advantageous configuration, the flexible line has a traction cable for strain relief. What is advantageous in this case is that mechanical strain relief is realised.

In one advantageous configuration, the locking unit and/or the energy store is/are embodied to be electrically heatable, in particular with control electronics being provided on the vehicle for this purpose. What is advantageous in this case is that even in the event of icing-up operation can be restored and/or at low temperatures heating of the energy store is made possible in order to restore its functioning.

Further advantages will become apparent from the dependent claims. The invention is not restricted to the combination of features of the claims. Further useful possible combinations of claims and/or individual claim features and/or features of the description and/or of the figures will become apparent to the person skilled in the art, in

particular from the posed problem and/or the problem which is posed by comparison with the prior art.

The invention will now be discussed in greater detail with reference to illustrations:

Figure 1 shows a truncated charging cable 9 according to the invention.

Figure 2 shows a charging station with a vehicle to be charged.

Figure 3 illustrates a detail thereof on an enlarged scale.

Figure 4 shows a section through the energy-transmitting region.

Figure 5 shows a charging station with two vehicles.

In Figure 6, a further vehicle is attached by means of a locking unit with locking means which is connected to the vehicle to a rod comprising electrical lines.

Figure 7 shows an oblique view of the locking unit with locking part illustrated in greater detail.

Figure 8 shows an associated sectional view.

In Figure 1, the charging cable 9 has different concentric portions. In this case, electrical insulation 1, in particular rubber coating, which serves as a touch guard is provided on the outer periphery. Radially within this insulation 1 there is provided a steel cable mesh 2 which offers protection against damage to the charging cable 9 by the action of tools, such as blades, saws and the like. Alternatively, movable sleeves can also be provided, which offer particularly effective protection against saws, since they have sleeves which can be turned by the saw along with it.

Radially within this mechanical protective layer, the coaxial arrangement of the charging cable continues with a portion to the electrical insulation 3, with again an electrically insulating plastics material being used here.

Radially within this insulation 3 there is provided a cable core 4 which is preferably made of copper. In this case, however, a copper litz wire mesh, in particular made of HF litz wire, in which the individual litz wires in each case have electrical insulation, can also be used.

Radially thereunder there adjoins in turn insulation 5, which is embodied as a portion to the electrical insulation.

Radially within this insulation there is in turn arranged a cable core 6 which is constructed corresponding to the cable core 4 and is surrounded radially to the inside by insulation 7. As the central portion there is provided a traction cable 8, so that mechanical strain relief is carried out.

Thus the charging cable 9 illustrated in Figure 1 is embodied as cut-proof and secured against mechanical effects.

Figure 2 shows the charging station, with the energy store 22 of a vehicle 21 being charged from an infeed device 20 of the charging station. Preferably the vehicle 21 is embodied as a two-wheeled vehicle and the energy store 22 is embodied as a battery or rechargeable battery.

On the vehicle 21, in particular on a part attached externally to the vehicle or on the housing of the vehicle, there is arranged a transformer unit 30, with a bolt 31 being able to be inserted through a cutout in the transformer unit 30, which bolt is arranged on an end region of the charging cable 9.

As illustrated in Figure 4, the bolt 31 has on its end region which is remote from the charging cable 9 a notch 42 with which it can be connected in a positive and/or non-positive manner in a closing unit 32 by means of actuating a locking unit encompassed

by the closing unit 32. Preferably the locking unit or closing unit 32 is in a pretensioned state, so that upon insertion of the bolt 31 a portion is snapped into the notch 42. Alternatively, a portion of the locking unit latches into the notch 42 upon the bolt 31 being inserted into the closing unit 32.

In the vehicle there is provided a secondary winding which at least partially surrounds the bolt 31 in an axial partial region of the bolt 31. Preferably the winding is embodied as a ring winding.

In this axial partial region there is preferably arranged a ferrite core portion, around which the primary winding 44 is arranged and wound. To this end, the bolt 31 is formed tapered in the axial region, i.e. the coil receiving region 41. The bolt 31 plus primary winding formed on the ferrite core portion is surrounded by a plastics-material layer for electrical insulation.

Preferably the bolt is passed through the spoke region or other cutout in a wheel of the vehicle and thus an immobilising means or immobiliser system is realised.

In this case, the transformer unit 30 is arranged on one side of the wheel and the closing unit 32 on the other side of the wheel.

The charging station 20 comprises an inverter, which operates as a medium-frequency voltage source and feeds a gyrator arrangement, the inductor and capacitor of which are arranged such that the associated resonant frequency corresponds substantially to the medium frequency. In this manner, current-source-like behaviour can be achieved on the output side of the gyrator arrangement. The current thus generated is conducted in the forward conductor of the charging cable 9, i.e. cable core 6, to the primary winding 44 and the current emerging from the primary winding 44 is returned to the gyrator arrangement via the return conductor, i.e. the cable core 4.

An impedance-matching transformer can be arranged between the gyrator arrangement and the primary winding 44.

A capacitor is connected in series or in parallel with the secondary winding 43 arranged on the vehicle such that the associated resonant frequency corresponds to substantially the medium frequency.

In addition to the contactless energy transmission, contactless data transmission is also carried out, so that data relating to the charging management of the energy store and to financial billing can be transmitted. To this end, status data and parameters of the energy store, in particular also in relation to the type of energy store, charging current, charging voltage and/or charging condition, are transmitted to the infeed device 20. The latter controls the current injected into the primary winding dependent on this data. Additionally, an identification number of the vehicle can also be transmitted to the charging station 20, as a result of which the costs for the energy can be deducted, for example debited from a bank account belonging to the owner of the vehicle. Alternatively, the charging station 20 has a reader for a credit card or prepaid card, as a result of which the card account of the credit card can be debited with an amount which corresponds to the amount of energy used for charging.

Owing to the positive connection of the bolt 31, on one hand a connection is produced between the closing unit 32 and the charging cable. Preferably the bolt 31 in this case is likewise introduced at least partially into a cutout in the closing unit 32 in the direction of the axis of the bolt 31. Thus a positive connection is also achieved already thereby in the radial direction. In the axial direction the bolt - as described above - is secured by means of the portion which latches or snaps in, and thus is connected in positive manner. On the other hand, the pushing through the cutout in the transformer unit 30 here too obtains a positive connection, viewed in the radial direction to the bolt axis. Thus the bolt is connected in positive manner in two units which are spaced apart from each other, and secured in a very stable manner in particular against radial forces. Since the spoke region of the wheel is arranged between the units, therefore a radial force applied to the bolt 31 in the radial direction by spokes can be absorbed in simple manner, as a result of which an effective immobilising means is produced. The vehicle is prevented from being pushed or carried away by means of the positive connection of the portion in the notch of the bolt or by means of corresponding locking techniques.

It is particularly advantageous to fix the bolt in the axial direction by means of snapping or latching the portion in. As a result, the primary winding too is held in as optimum an axial position as possible relative to the secondary winding, as a result of which high efficiency in the energy transmission can be achieved and thus rapid charging can be carried out.

In an alternative embodiment to the contactless energy supply, the forward conductor and return conductor of the charging cable are guided to the outer surface of the bolt in the region corresponding to the coil receiving region. Thus spring contacts can be provided on the vehicle side, as a result of which electrical contact can be brought about and the charging current can be conducted directly. In this manner, so to speak electrical contacting can also be jointly brought about upon locking. In this manner, only a simple inexpensive charger which controls the charging current or the charging voltage for the energy store needs to be provided in the charging station. One or more additional contacts can be arranged for control lines for data transmission, the control lines being provided integrated into the charging cable.

Figures 6 to 8 show an alternative embodiment.

In this case, the vehicle 21 has a locking unit 60 with locking means which is connected in positive manner to a rod 61 as stationarily arranged means. To this end, the locking means 70 again is embodied with a primary winding 83 which is wound around a ferrite core 80. This ferrite core 83 resembles a half slice of pineapple, i.e. is semi-toroidal.

The locking means 70 is attached by means of a rotary joint 72 to a locking unit 71 which comprises an upper side piece in which likewise a semi-toroidal ferrite core 81 is arranged, so that the two ferrite cores (80, 81) between them form a closed ferrite core if the locking means is closed with the locking unit. In this state, the closed ferrite core then encompasses the rod 61, which has the primary line.

By overcoming the spring force of the spring element 82, the locking unit can be opened, i.e. the locking means 70 can be partially lifted off from the locking unit 71, in

particular by rotary movement at the rotary joint 72. In this manner, the positive lock can be cancelled out and the locking unit can be removed from the rod 61.

Preferably a lock is provided on the rotary joint 72, so that the connection between the locking unit 71 and locking means 70 can only be opened once the lock has been opened. In this manner, security is increased.

List of reference numerals

1	insulation, in particular rubber coating
2	steel cable mesh
3	insulation
4	cable core
5	insulation
6	cable core
7	insulation
8	traction cable for strain relief
9	charging cable
20	infeed device
21	vehicle, in particular two-wheeled vehicle
22	energy store, in particular battery or rechargeable battery
30	transformer unit
31	bolt
32	closing unit
41	coil receiving region
42	notch
43	secondary winding
44	primary winding
60	locking unit with locking means
61	rod as stationarily arranged means
70	locking means
71	locking unit
72	rotary joint
80	ferrite core
81	ferrite core
82	spring element
83	primary winding

Patentkrav

1. Anordning til tilslutning af et køretøj (21) til et stationært anbragt middel (20), hvor der er anbragt en låseenhed (30) på køretøjet (21), som formsluttende kan forbindes med
en lukkedel (31), som er forbundet med det stationært anbragte middel (20) via en fleksibel ledning (9),
hvor lukkedelen (31) omfatter midler (43, 44) til energioverførsel, især overførsel af elektrisk energi,
kendetegnet ved, at
lukkedelen (31) er anvendt som startspærre og/eller drejespærre for et hjul,
hvor lukkedelen (31) trænger igennem egeområdet på et hjul af køretøjet (21).

2. Anordning ifølge krav 1,
kendetegnet ved, at
den fleksible ledning omfatter mindst en elektrisk ledning.

3. Anordning ifølge krav 2,
kendetegnet ved, at
der anvendes elektriske kontakter som middel til energioverførsel, især hvor lukkeenheden til det formål har elektriske kontaktflader på sin udvendige flade, som kan kontakteres af køretøjets kontakteringsmidler, som er anbragt i køretøjet, især hvor ladestrømmen til et energilager kan føres via første kontakteringsmidler, især via to, især hvor yderligere kontakteringsmidler er tilvejebragt til gennemledning af ledningsbundne signaler til dataoverførsel.

4. Anordning ifølge krav 2,
kendetegnet ved, at
der som middel til energioverførsel er tilvejebragt en sekundærvikling, der er anbragt i køretøjet, og som kan kobles induktivt til en primærvikling, som er omfattet af lukkedelen og er forsynet via den fleksible ledning.

5. Anordning ifølge krav 4,
kendetegnet ved, at
et tilførselsapparat tilfører primærviklingen en vekselstrøm, hvor en kapacitet er serie- og/eller parallelkoblet med sekundærviklingen på en sådan måde, at

den tilhørende resonansfrekvens svarer i det væsentlige til frekvensen af den tilførte vekselstrøm.

6. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
køretøjets låseenhed er anbragt på en første side af et hjul af køretøjet, og lukkeenheden i en med låseenheden forbundet tilstand trænger igennem i det mindste delvist en udsparing af en yderligere enhed, hvor hjulet er tilvejebragt mellem denne yderligere enhed og låseenheden.

7. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
den fleksible ledning har et ståltrådflet eller hærdede stålmuffer.

8. Anordning ifølge krav 7,
kendetegnet ved, at
der inde i ståltrådflettet er tilvejebragt mindst to elektriske ledninger, som er anbragt i afstand fra hinanden.

9. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
den fleksible ledning har en rotationssymmetrisk og/eller koaksial opbygning.

10. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
den fleksible ledning har et trækkabel til aflastning.

11. Anordning ifølge mindst et af de foregående krav, **kendetegnet ved, at** låseenheden og/eller et energilager er udført til at kunne blive elektrisk opvarmet, især hvor der til det formål er tilvejebragt en styreelektronik på køretøjet.

12. Anordning ifølge krav 4
kendetegnet ved, at lukkedelen og låsedelen er anbragt på køretøjet, hvor lukkedelen omfatter sekundærviklingen.

13. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
lukkedelen ved hjælp af et drejeled er anbragt på låseenheden, især hvor drejeleddet har en lås til lukning eller åbning.

14. Anordning ifølge mindst et af de foregående krav,
kendetegnet ved, at
det stationært anbragte middel er en stang, som omfatter elektriske ledninger.

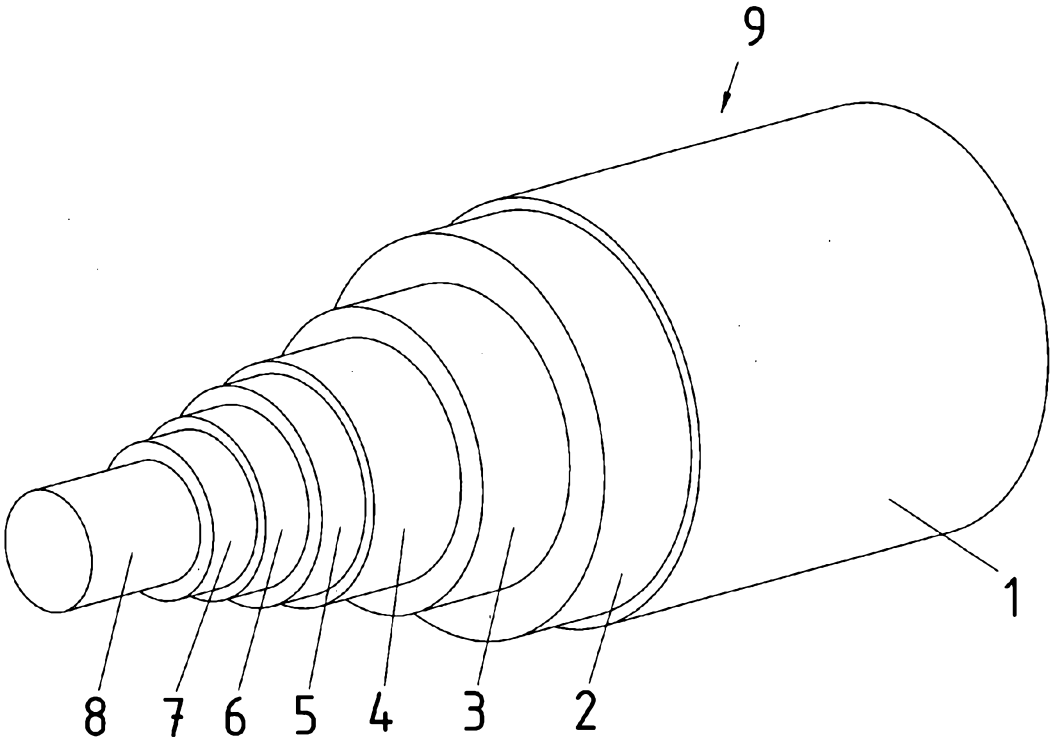

Fig. 1

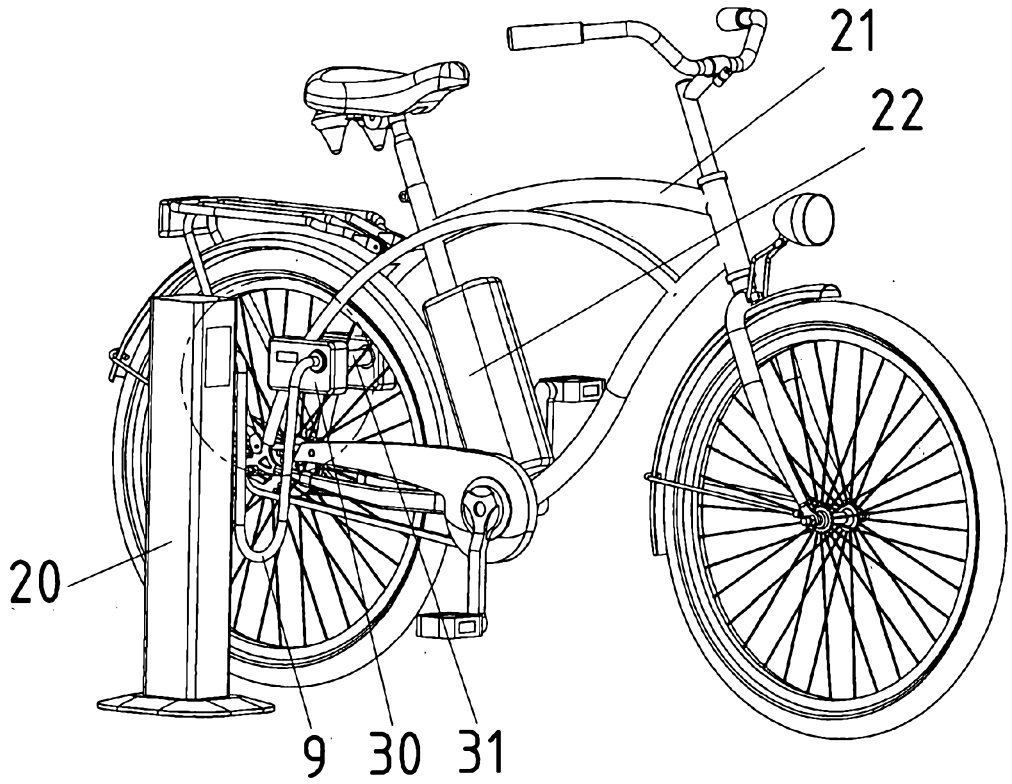

Fig. 2

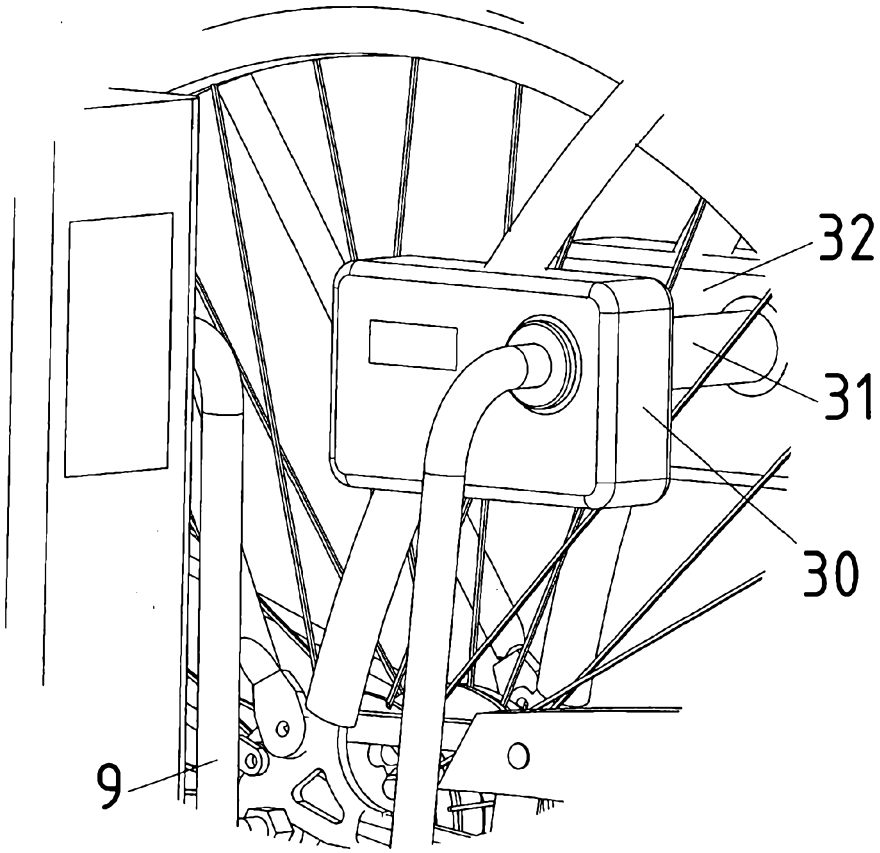

Fig. 3

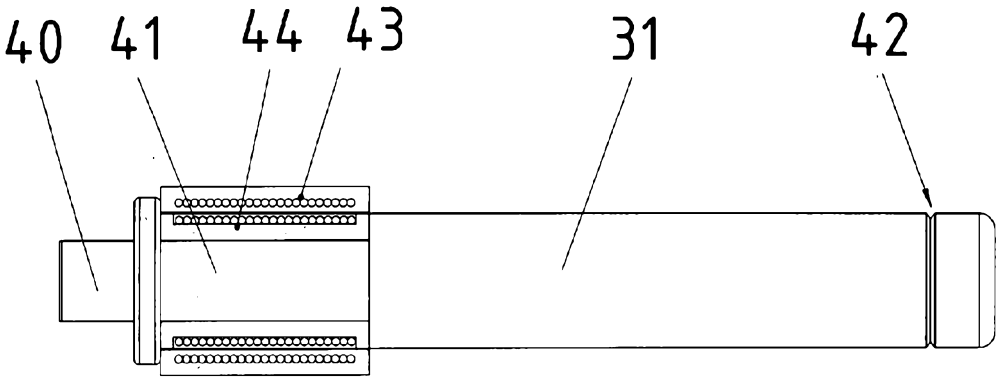

Fig. 4

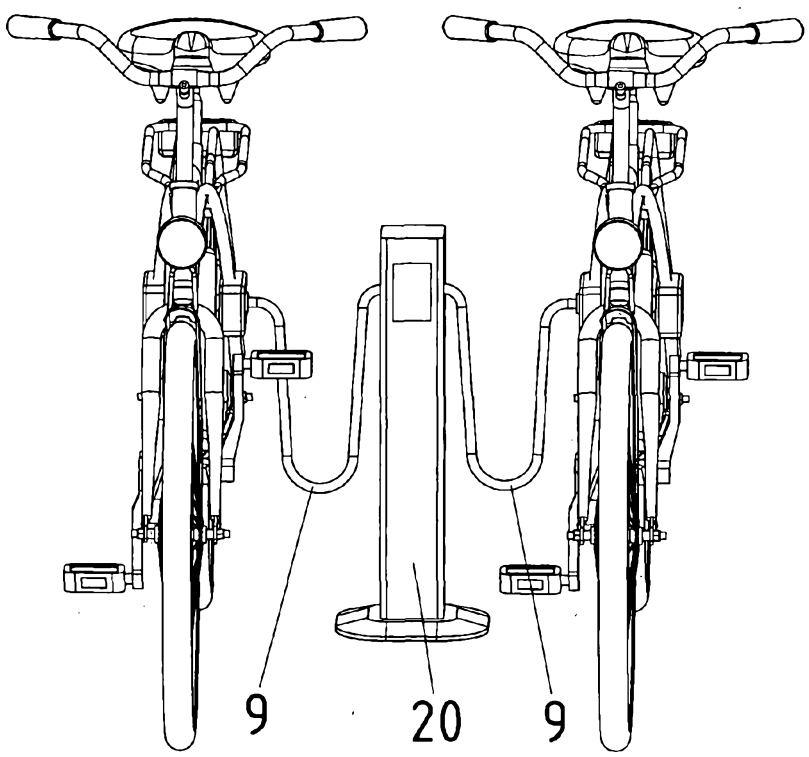

Fig. 5

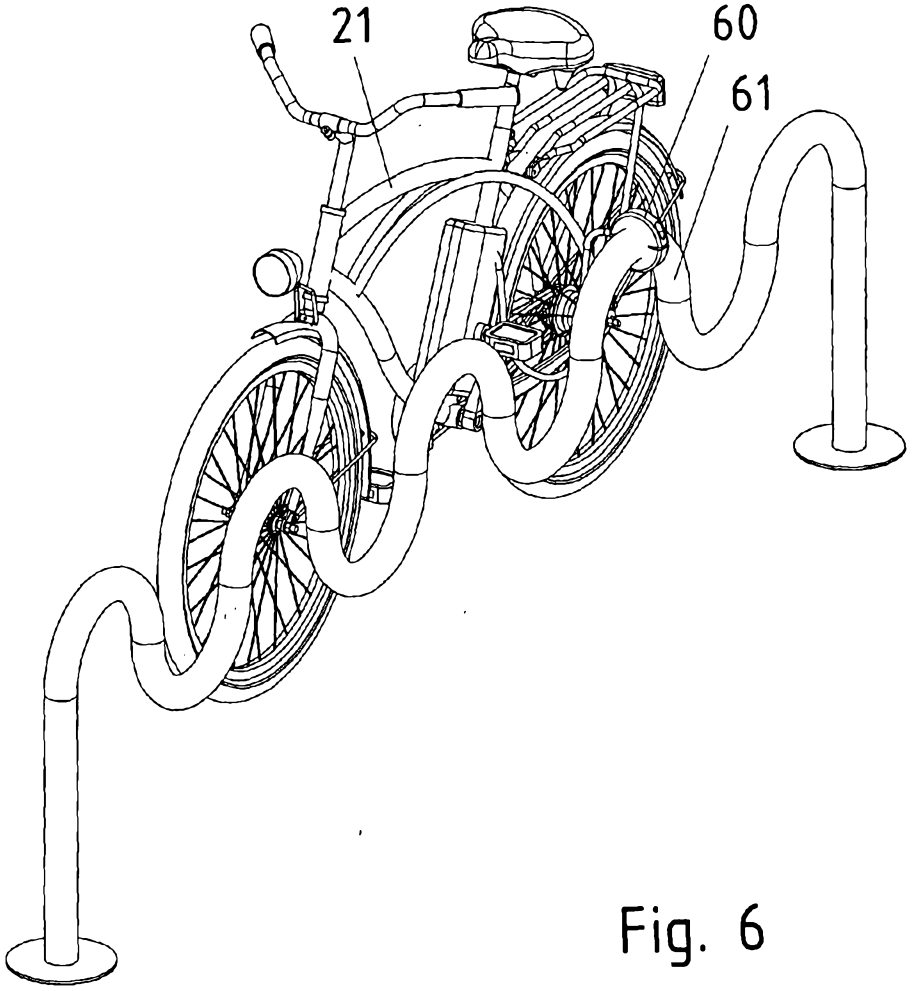

Fig. 6

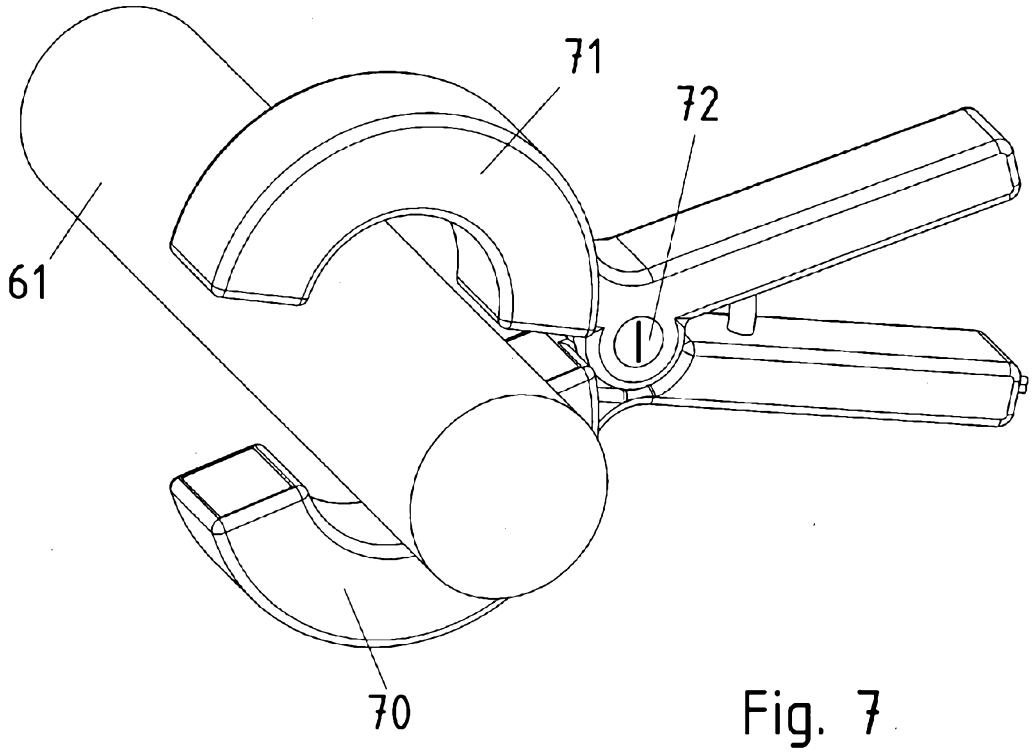

Fig. 7

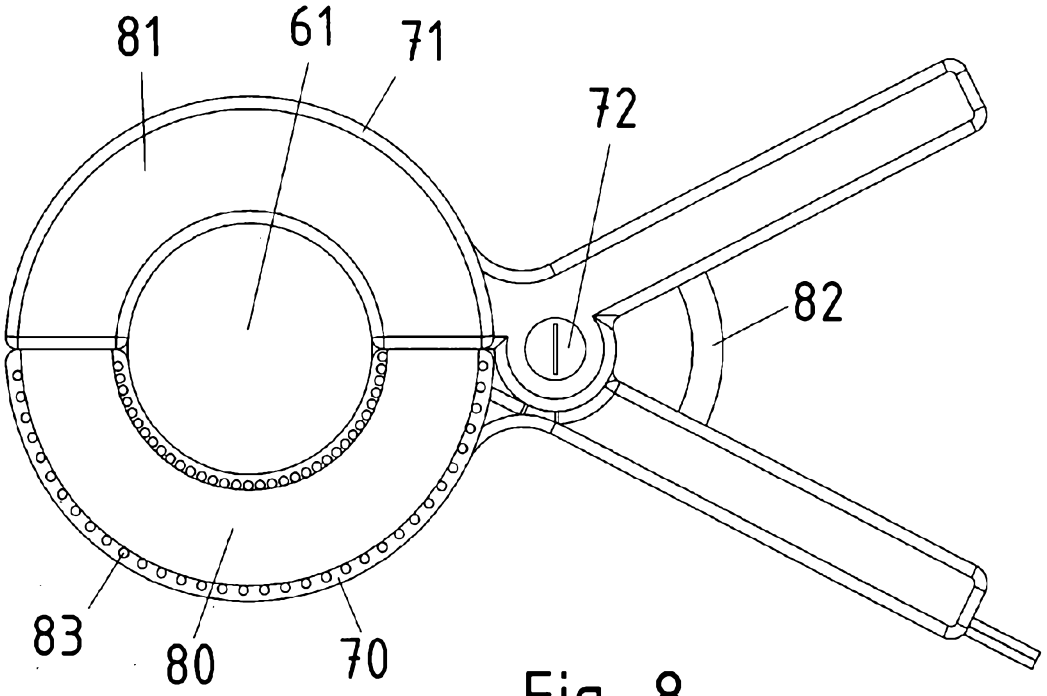

Fig. 8