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(54) **POWER DRIVEN COMPRESSOR SYSTEM FOR VEHICLES**

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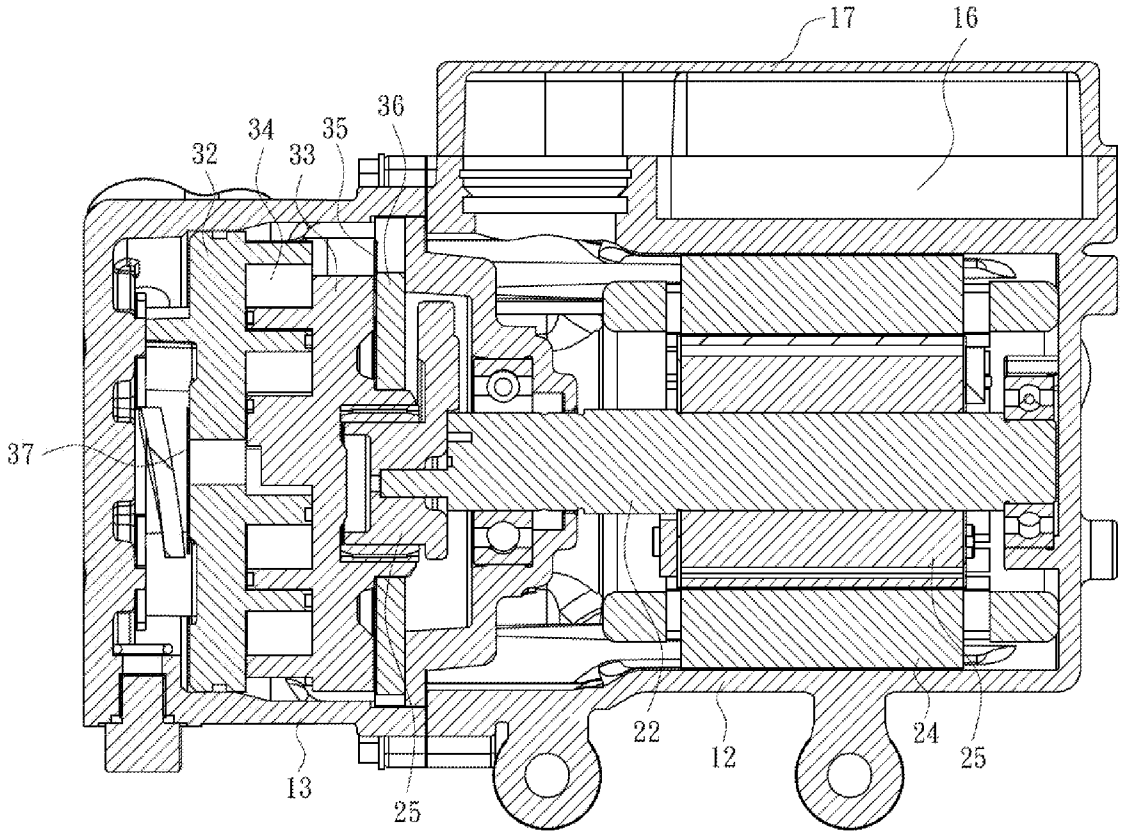
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(57) **ABSTRACT**

A power driven compressor system for vehicle includes: a housing, formed with a driving circuit accommodating room; a transmission set disposed in the housing and driven by electrical power to produce a rotating magnetic for rotating a transmission axle; a scroll set comprised of a static scroll and a orbiting scroll. The orbiting scroll is driven by the transmission axle to rotate eccentrically with respect to the static scroll. An Oldham ring is disposed between the orbiting scroll and the housing. The Oldham ring has a cross-like limiting part. A concave part corresponding to the limiting part is formed on the housing and the orbiting scroll to limit the motion of the orbiting scroll.



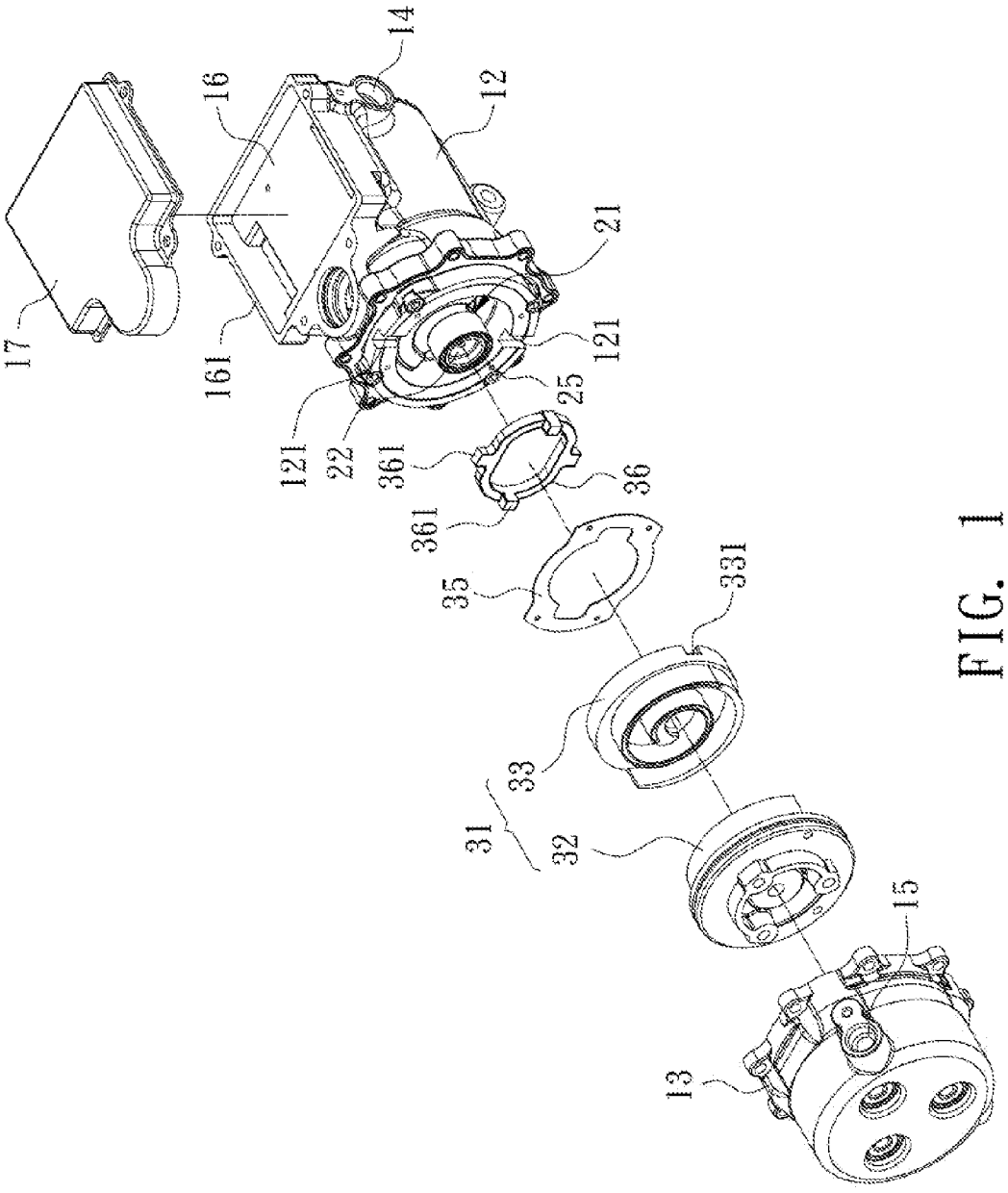


FIG. 1

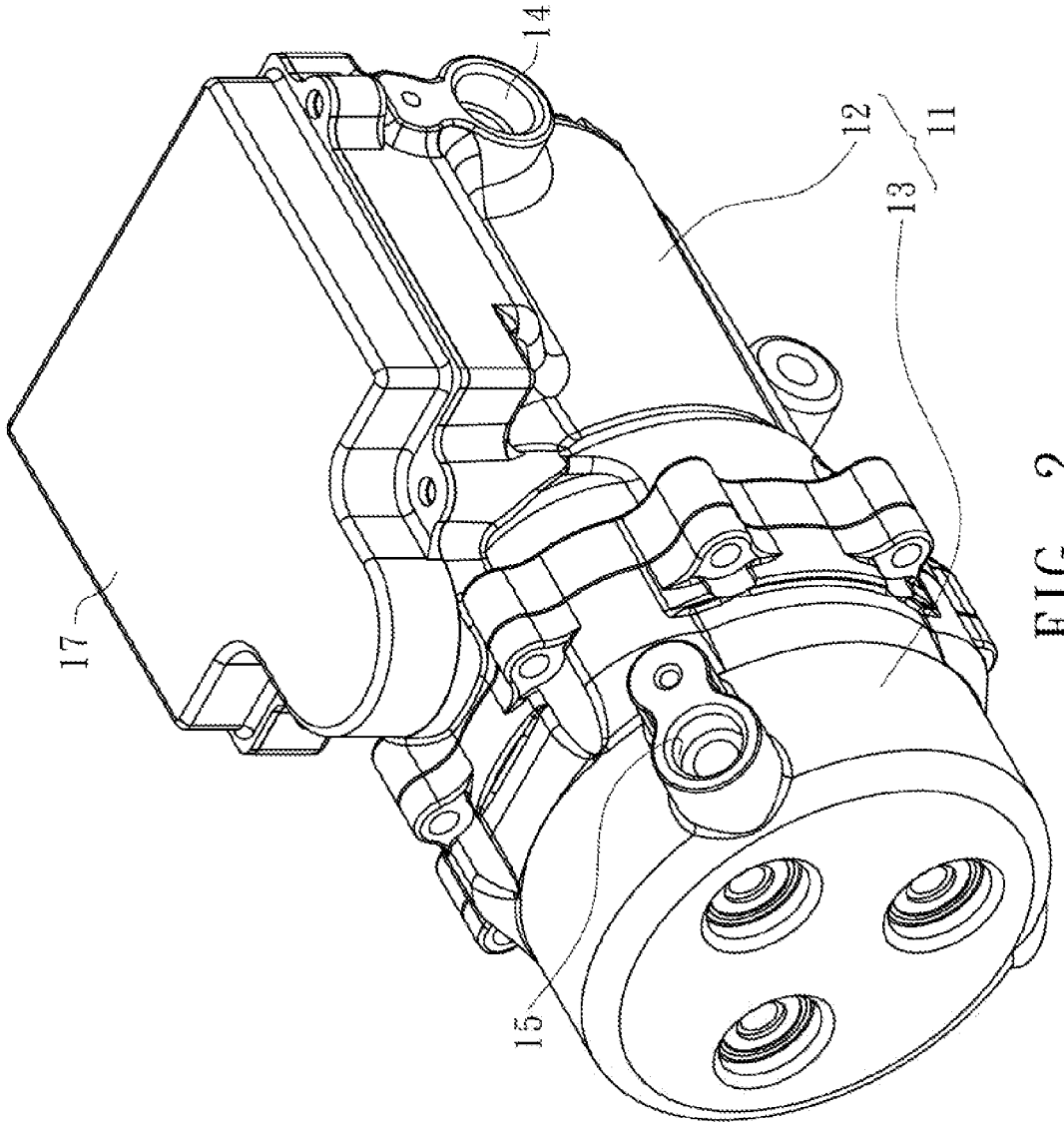


FIG. 2

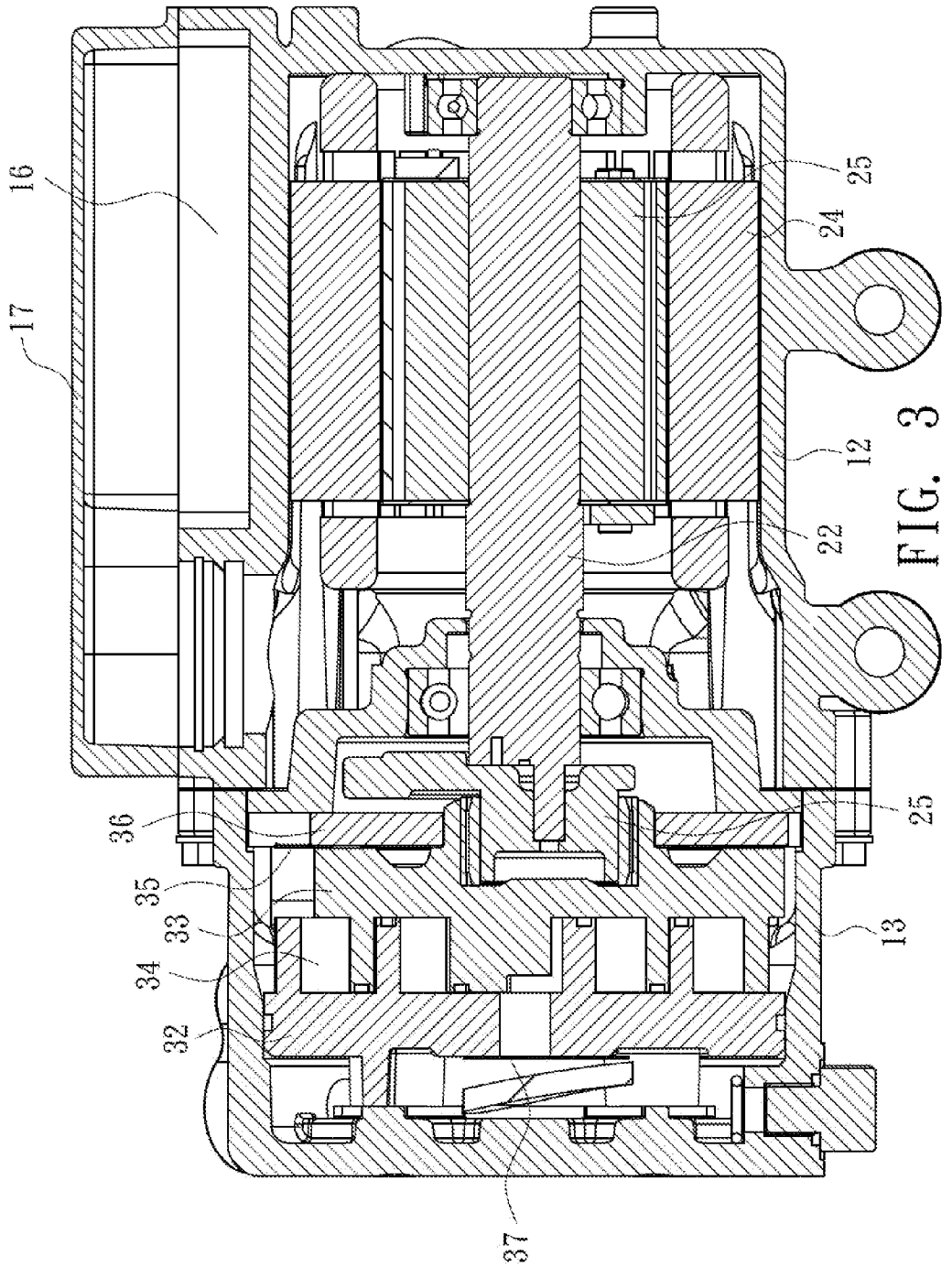


FIG. 3

POWER DRIVEN COMPRESSOR SYSTEM FOR VEHICLES

BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The invention relates to a compressor and, in particular, to a power driven compressor system for vehicles.

[0003] 2. Related Art

[0004] A normal vehicle compressor system utilizes the power of gas engine for its operation. However, in view of the rising oil price and limited natural resources, all carmakers have been trying to develop electric cars. Therefore, it is a natural trend for vehicle compressor systems to use electrical power.

[0005] Nevertheless, current power driven compressor systems (e.g., those in refrigerators) cannot be directly used in vehicles. The reason is as follows.

[0006] Ordinary home electronic compressor systems are formed with a room for holding coolant oil at their bottom. When the compressor is running, the coolant oil is simultaneously sucked up to lubricate the internal components of the compressor. Therefore, the home electronic compressors can only run is a static environment. This is to prevent damages if the coolant oil cannot be sucked up and the lubrication is not enough. Since running vehicles must have vibrations, home electronic compressor systems cannot be applied to vehicles.

[0007] Moreover, as the environmental temperature due to the vehicle operation is higher, the compressor motor tends to overheat and lowers its efficiency. The high environmental temperature also has the problem of circuit damages in the compressor system.

SUMMARY OF THE INVENTION

[0008] An objective of the invention is to provide a power driven compressor system for vehicles. The compressor is completely driven by electrical power. During its operation, the compressor has a better cooling effect.

[0009] To achieve the above objective, the disclosed compressor system includes: a housing, a transmission set, and a scroll set.

[0010] The housing consists of a bottom cover and an end cover. The bottom cover has an air inlet. The end cover has an air outlet. The end cover is further formed with a driving circuit accommodating room in fluid communications with the end cover.

[0011] The transmission set is disposed in the bottom cover. It includes a transmission axle, a rotor connected on the transmission axle, and a stator around the rotor. The transmission set is driven by electrical power to produce a rotating magnetic field. The rotor thus rotates the transmission axle.

[0012] The scroll set is disposed in the end cover. It consists of a static scroll and an orbiting scroll. The orbiting scroll connects to the transmission axle, and rotates eccentrically with respect to the static scroll for compression. An Oldham ring is disposed between the orbiting scroll and the bottom cover. The Oldham ring has a cross-like limiting part. A concave part corresponding to the limiting part is formed on the bottom cover and the orbiting scroll to limit the motion of the orbiting scroll.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention will become more fully understood from the detailed description given herein below illustration only, and thus is not limitative of the present invention, and wherein:

[0014] FIG. **1** is a three-dimensional exploded view of the invention;

[0015] FIG. **2** is a three-dimensional view of the invention after assembly; and

[0016] FIG. **3** is a cross-sectional view of the invention after assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0017] The present invention will be apparent from the following detailed description, which proceeds with reference to the accompanying drawings, wherein the same references relate to the same elements.

[0018] First, please refer to FIGS. **1** to **3** for the power driven compressor system for vehicles according to the invention. It includes a housing **11**, a transmission set **21**, and a scroll set **31**.

[0019] The housing **11** consists of a bottom cover **12** and an end cover **13**. The bottom cover **12** has an air inlet **14**. The end cover **13** has an air outlet **15**. The bottom cover **12** is fonned with a driving circuit accommodating room **16** in communications with the interior thereof and having an open end **161**. A sideboard **17** correspondingly covers the open end **161** of the driving circuit accommodating room **16**, blocking its communications with the external space. Two opposite concave parts **121** are formed around the open end of the bottom cover **12**.

[0020] The transmission set **21** is disposed in the bottom cover **12**. It includes a transmission axle **22**, a rotor **23** connected on the transmission axle **22**, and a stator **24** disposed around the rotor **23**. The coil of the transmission set **21** is made of an enamel-insulated wire. The stator **24** is fixed on the inner wall of the bottom cover **12**. The driving end of the transmission axle **22** is disposed eccentrically with a bearing **25**. The rotor **23** is driven by the rotating magnetic field produced by the power driven stator **24** to rotate the transmission axle **22**.

[0021] The scroll set **31** is disposed in the end cover **13**. It consists of a static scroll **32** and an orbiting scroll **33**. The two scrolls **32**, **33** have matching spiral inner walls so that a compression space **34** is formed in between. The bottom end of the orbiting scroll **33** connects to the bearing **25** on the driving end of the transmission axle **22**. The orbiting scroll **33** thus orbits eccentrically with respect to the static scroll **32**. As the orbiting scroll **33** orbits around the static scroll **32**, the volume of the compression space **34** changes to compress the working fluid. Moreover, the bottom end of the orbiting scroll **33** has two opposite concave parts **331**. A limiting plate **35** and an Oldham ring **36** are disposed between the orbiting scroll **33** and the bottom cover **12**. The Oldham ring **36** has a cross-like limiting part **361** to be accommodated in the orbiting scroll **33** and the concave parts **331**, **121** of the bottom cover **12**. With the concave parts **331**, **121**, the motion of the limiting part **361** of the Oldham ring **36** is restricted, which in turn limits the motion of the orbiting scroll **33**. Its eccentric orbiting radius is restricted within a predetermined value.

[0022] During actual operations, electrical power directly drives the transmission set **21**. The transmission set **21** sucks a working fluid, which is a mixture of low-pressure coolant and coolant oil, into the bottom cover **12** via the air inlet **14** on the bottom cover **12** and fills it. In addition to effectively cooling and lubricating the transmission set **21** in the bottom cover **12**, the circuit in the driving circuit accommodating room **16** is also cooled as the driving circuit accommodating room **16** is in fluid communications with the bottom cover **12**.

The working fluid in the interior of the bottom cover **12** is sucked by the eccentric orbiting of the orbiting scroll **33** into the compression space **34** between the orbiting scroll **33** and the static scroll **32**. The working fluid compressed to high pressure passes through a valve **37** composed of reeds, and leaves via the air outlet **15** of the end cover **13** for external uses. Of course, the working fluid sucked in by the scroll set **31** can simultaneously cool and lubricate the internal components of the end cover **13**.

[0023] The invention has the following advantages:

[0024] 1. The invention uses a working fluid which is a mixture of low-pressure coolant and coolant oil. Therefore, the disclosed compressor system can be used in a vehicle and a non-static environment. When the transmission set **21** is driven by electrical power, the working fluid enters the compressor via the air inlet **14** of the bottom cover **12**. The components in the compressor is both cooled and lubricated at the same time. This can reduce damages to the compressor motor.

[0025] 2. The driving circuit accommodating room **16** formed on the bottom cover **12** is in communications with the bottom cover **12**. When the working fluid enters the bottom cover **12**, the circuits in the driving circuit accommodating room **16** can be also cooled. This reduces the possibility of overheating on the circuits.

[0026] 3. An Oldham ring is disposed between the orbiting scroll **33** and the bottom cover **12**. The cross-like limiting part **361** on the Oldham ring **36** are correspondingly accommodated in the concave parts **121**, **331** on the bottom cover **12** and the orbiting scroll **33**. The concave parts **121**, **331** can limit the motion of the limiting part **361** on the Oldham ring **36**. The orbiting scroll **33** is thus restricted to orbit within a predetermined eccentric orbiting radius.

[0027] Although the invention has been described with reference to specific embodiments, this description is not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as alternative embodiments, will be apparent to people skilled in the art. Therefore, it is contemplated that the appended claims will cover all modifications that fall within the true scope of the invention.

What is claimed is:

1. A power driven compressor system for vehicles, comprising:

a housing, which consists of a bottom cover and an end cover, the bottom cover being fonned with an air inlet, the end cover being formed with an air outlet, and the end cover being further fonned with a driving circuit accommodating room in fluid communications with the end cover;

a transmission set, which is disposed in the bottom cover and includes a transmission axle, a rotor connected on the transmission axle, and a stator disposed around the rotor, the transmission set being driven by electrical power to generate a rotating magnetic field so that the rotor drives the transmission axle to rotate concurrently; and

a scroll set, which is disposed in the end cover and consists of a static scroll and an orbiting scroll, the orbiting scroll connecting to the transmission axle and orbiting eccentrically with respect to the static scroll to provide a compression effect;

wherein an Oldham ring is disposed between the orbiting scroll and the bottom cover, the Oldham ring has a cross-like limiting part, and concave parts corresponding to the limiting part are formed on the bottom cover and the orbiting scroll to restrict the motion of the orbiting scroll.

2. The power driven compressor system for vehicles of claim **1**, wherein the bottom cover has an open end, and a side board correspondingly covers the open end of the driving circuit accommodating room to block the communication between the driving circuit accommodating room and the external space.

3. The power driven compressor system for vehicles of claim **1**, wherein the coil in the transmission set is made of an acid- and alkaline-proof enamel-insulated wire.

4. The power driven compressor system for vehicles of claim **1**, wherein the stator is fixed on the inner wall of the bottom cover, a bearing is disposed eccentrically on the driving end of the transmission axle, and the bottom end of the orbiting scroll connects to the bearing on the driving end of the transmission axle.

5. The power driven compressor system for vehicles of claim **1**, wherein the transmission set sucks in a working fluid, which is a mixture of a low-pressure coolant and coolant oil, via the air inlet on the bottom cover.

6. The power driven compressor system for vehicles of claim **1**, wherein the open end of the bottom cover is formed with two opposite concave parts and the bottom end of the orbiting scroll is formed with another two opposite concave parts, the cross-like limiting part on the Oldham ring is accommodated in the concave parts, the concave parts restrict the motion of the limiting part on the Oldham ring, thereby restricting the orbiting scroll to orbit within a predetermined eccentric orbiting radius.

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