POWER HAND TOOL HAVING POWER TRANSMISSION CLUTCH

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ABSTRACT

A power hand tool includes a housing for holding a motor therein, a transmission gear set coupled to an output shaft of the motor, a first power transmission member coupled to an output gear of the transmission gear set, a second power transmission member which is rotatably mounted in the housing and coupled to the first power transmission member for synchronous rotation when it is axially inwardly pressed, and a spring member for pushing the second power transmission member away from the first power transmission member for enabling the first power transmission member to run idle.
POWER HAND TOOL HAVING POWER TRANSMISSION CLUTCH

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to power hand tools and more particularly, to a power hand tool, which has a power transmission clutch.

2. Description of the Related Art

A conventional power screwdriver is known comprising a motor, a transmission gear set coupled to the output shaft of the motor and adapted to reduce the revolving speed and increase the torque for output through an output member, which has a connector for receiving a screwdriver bit (cabinet bit, keystone bit, or Phillips head bit) for rotating the workpiece.

The aforesaid power screwdriver is functional; however, it is not safe in use. When the user pressed on the on/off button, the tool bit is rotated immediately with the output member. When a child plays with this kind of power screwdriver for fun and/or an unskilled person uses this kind of power screwdriver, an accident may happen accidentally.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is therefore the primary object of the present invention to provide a power hand tool, which automatically interrupts power transmission when not in the operative status, preventing the occurrence of an accident.

To achieve this object of the present invention, the power hand tool comprises a housing, a motor fixedly mounted inside the housing, a transmission gear set mounted inside the housing, a first power transmission member, a second power transmission member and a spring member. The transmission gear set has an input gear fixedly mounted on an output shaft of the motor, and an output gear rotatable by the input gear directly or indirectly. The first power transmission member is coupled to the output gear for rotation with the output gear. The first power transmission member has a coupling hole. The second power transmission member is rotatably mounted inside the housing and axially movable in the housing between a first position and a second position. The second power transmission member has a coupling portion disposed at a first end thereof and a coupling hole disposed at a second end thereof outside the housing for receiving a tool bit. The coupling portion of the second power transmission member is engaged into the coupling hole of the first power transmission member for allowing rotation of the second power transmission member with the first power transmission member when the second power transmission member is moved to the second position. The coupling portion of the second power transmission member is disengaged from the coupling hole of the first power transmission member for allowing the first transmission member to run idle when the second power transmission member is moved to the first position. The spring member is mounted in the coupling hole of the first power transmission member and stopped against the second power transmission member to support the second power transmission member in the first position.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of a power hand tool according to a preferred embodiment of the present invention.

FIG. 2 is another exploded view in an enlarged scale of a part of the power hand tool according to the preferred embodiment of the present invention.

FIG. 3 is a partial sectional view of the power hand tool of the preferred embodiment of the present invention, showing the second power transmission member disconnected from the first power transmission member.

FIG. 4 is similar to FIG. 3 but showing the second power transmission member connected to the first power transmission member.

DETAILED DESCRIPTION OF THE INVENTION

As shown in FIGS. 1 and 2, a power hand tool 100 in accordance with the preferred embodiment of the present invention comprises a housing 10, a motor 20, a first shaft sleeve 31, a second shaft sleeve 32, a transmission gear set 40, a first power transmission member 50, a spring member 60, and a second power transmission member 70.

The housing 10 comprises two half shells, namely, the first half shell 11 and the second half shell 12. The two half shells 11 and 12 are abutted against each other and affixed together.

The motor 20 is fixedly mounted inside the housing 10, having an output shaft 21.

The transmission gear set 40 is mounted inside the housing 10, comprising an input gear 41 fixedly mounted on the output shaft 21 of the motor 20 and an output gear 42 meshed with the input gear 41. During rotation of the motor 20, the input gear 41 drives the output gear 42 to rotate at a relatively lower revolving speed. Intermediate gears may be coupled between the input gear 41 and the output gear 42 for producing various speed-reducing functions.

The first power transmission member 50 is fixedly mounted on the output gear 42, having a coupling hole 51. The coupling hole 51 is a hexagonal hole. Further, the central axis of the first power transmission member 50 coincides with the transmission axis of the output gear 42.

The first shaft sleeve 31 is sleeved onto the first power transmission member 50 and affixed to the inside of the housing 10.

The spring member 60 is mounted in the coupling hole 51 of the first power transmission member 50.

The second shaft sleeve 32 is fixedly mounted inside the housing 10. Further, the central axis of the second shaft sleeve 32 coincides with the central axis of the first shaft sleeve 31.

The second power transmission member 70 is a round rod inserted through the second shaft sleeve 32, having a coupling portion 72 of a hexagonal pin and axially extended from one end thereof for coupling to the hexagonal coupling hole 51 of the first power transmission member 50 and a hexagonal coupling hole 71 axially disposed in the other end for receiving a tool bit. The second power trans-
mission member 70 can be rotated in the second shaft sleeve 32 and axially movable relative to the second shaft sleeve 32 between a first position and a second position. The hexagonal coupling hole 71 of the second power transmission member 70 is kept exposed to the outside of the housing 10. When the second power transmission member 70 is in the second position, the coupling portion 72 is engaged into the coupling hole 51 of the first power transmission member 50. The second power transmission member 70 further has a locating groove 73 extending around the periphery for the mounting of a C-shaped retainer 74 to define the first position.

[0021] The operation of the power hand tool 100 is quite simple and outlined hereinafter.

[0022] When the power hand tool 100 is not used, the spring member 60 forces the second power transmission member 70 out of the first power transmission member 50, i.e., the spring member 60 supports the second power transmission member 70 to the first position, as shown in FIG. 3, where the C-shaped retainer 74 is stopped at a portion of the housing 10. In case the user starts the motor 20 accidentally at this time, the motor 50 drives the transmission gear set 40 and the first power transmission member 50 to rotate; however, this rotary driving force is not transmitted to the second power transmission member 70, i.e., the tool bit 80 (for example, screwdriver bit) is not rotated.

[0023] When using the power hand tool 100, the user will stop the tool bit 80 against the workpiece 90 (for example, screw). At this time, a reactive force F will be produced from the workpiece 90 to push the second transmission member 70 against the spring member 60 toward the second position, as shown in FIG. 4, thereby forcing the coupling portion 72 into the hexagonal coupling hole 51 of the first power transmission member 50. Therefore, the rotary driving force from the motor 20 is transmitted through the transmission gear set 40 to the first power transmission member 50 and then the second power transmission member 70, thereby causing the tool bit 80 to rotate the workpiece 90.

[0024] When the user disengaged the tool bit 80 from the workpiece 90, the aforesaid reactive force F is disappeared, and the spring member 60 immediately pushes the second power transmission member 70 from the second position to the first position, and therefore the connection between the first power transmission member 50 and the second power transmission member 70 is interrupted. In other words, the power hand tool 100 provides a power transmission clutch constructed mainly by the first power transmission member 50, the spring member 60 and the second power transmission member 70.

What is claimed is:

1. A power hand tool comprising:
   a housing;
   a motor fixedly mounted inside said housing, said motor having an output shaft;
   a transmission gear set mounted inside said housing, said transmission gear set having an input gear fixedly mounted on the output shaft of said motor, and an output gear rotatable by said input gear directly or indirectly;
   a first power transmission member coupled to said output gear for rotation with said output gear, said first power transmission member having a coupling hole;
   a second power transmission member rotatably mounted inside said housing and axially movable in said housing between a first position and a second position, said second power transmission member having a coupling portion disposed at a first end thereof and a coupling hole disposed at a second end thereof outside said housing for receiving a tool bit, said coupling portion of said second power transmission member being engaged into the coupling hole of said first power transmission member for allowing rotation of said second power transmission member with said first power transmission member when said second power transmission member is moved to said second position, said coupling portion of said second power transmission member being disengaged from the coupling hole of said first power transmission member for allowing said first transmission member to run idle during operation of said motor when said second power transmission member is moved to said first position; and
   a spring member mounted in the coupling hole of said first power transmission member and stopped against said second power transmission member to support said second power transmission member in said first position.

2. The power hand tool as claimed in claim 1, further comprising two shaft sleeves respectively sleeved onto said first power transmission member and said second power transmission member and fixedly mounted inside said housing.

3. The power hand tool as claimed in claim 1, wherein the coupling hole of said first power transmission member is a hexagonal hole, and the coupling portion of said second power transmission member has a shape fitting the hexagonal coupling hole of said first power transmission member.