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(54) Title: AN OLIVE HARVESTING MACHINE WITH A GEAR BOX PROVIDING FREEDOM OF COMB MOVEMENT

(57) Abstract: This invention is related to an olive shaking machine used in olive harvesting. The invention is particularly related to olive harvesting machines which provides high torque at low speeds as a result of first transmitting the rotation movement received from the motor drive gears to a plurality of timing gears by means of a gear group and to the curved connecting rods by means of the timing gears.



AN OLIVE HARVESTING MACHINE WITH A GEAR BOX PROVIDING FREEDOM OF COMB MOVEMENT

Technical Field

This invention is related to olive shaking machines used in the olive harvesting. The machine is classified in the shaking olive harvesting machine. Its head portion consists of shaker sticks aligned with determined angles on two combs, cartel upon which combs are articulated, a gear box fixed to the cartel and an electrical motor. Its handle portion consists of a telescopic or a fixed pipe. The electrical cable of the motor reaches up to the handgrip; it goes outside after its contact with on off button is enabled. From here it is connected to a power unit.

The invention is particularly related to an olive harvesting machine which obtains high torque at low speeds as a result of first transmitting the rotation movement received from the motor drive gears to a plurality of timing gears by means of a gear group and to the curved connecting rods by means of the timing gears, and from here to the combs. There are two curved connecting rods, one end is articulated to the timing gears and the other end is articulated to the combs. By positioning two timing gears in a different manner, the combs are enabled to move in a different manner compared to each other. Accordingly in the first situation when we position the two combs in the upper and lower dead points, it is possible to move the two combs simultaneously to the right and to the left laterally (Figure 1,2). Its advantage is to prevent shearing in the side by side positioned machines with combs and to protect the health of the tree by decreasing the offshoot bearing ratio in the olive tree in this manner and prevent decrease the next year's harvest yield. The second condition is the operation position of the timing gears simultaneously when they are at upper and lower dead points (Figure 3,4). In this case the comb movement made is their approaching to each other and moving away from each other. In this motion form, the combs make shearing however they do not make balance, the machine gives minimum vibration to its user and protects the user of the machine ergonomically. According to the usage condition and these two positioning forms for creating advantage, different two motions with one machine and interim variations of these are provided.

Prior Art

Olive harvesting is a process which shall be done without giving damage to the tree however because the number of olives on one tree is too much, it is a process that cannot be performed by hand.

Olive harvesting can be made by shaking the tree without using any machine. However this process is very tiring for reasons that both cause occupational illnesses and provides a very low efficiency. For this reason various techniques and machines have been developed for olive harvesting.

Mechanical olive harvesting can be done by means of the machines which are mounted to the vehicles such as a tractor and enable to shake the whole tree. In this method, the tree is shaken by means of big combs that are inserted between the branches of the tree and harvesting is performed. Although this method provides a high efficiency, the machines have disadvantages because they are both big and costly and disadvantageous in respect to usage and invention.

Another method used in olive harvesting is done by means of the variations of the portable shaking machines. In portable harvesting machines, sticks are used for shaking process in the current art and combs give motion to these sticks. Both ends of the combs enable shaking process by means of performing asymmetric upward, downward, left and right motions.

In the current art, the comb directions are fixed because the connection points of the connecting rods are the same. The positions and directions of the comb do not change. In the machine with gear box that provides freedom of movement to the comb, different motions can be obtained by means of a single machine by making an advantageous required positioning.

In some systems included within the present state of the art, the connecting rods are used with a flat structure and this comb causes the cartel engagement point to protrude outside, thus to enlarge the cartel and to increase costs.

In order to transmit motion from only one gear to the connecting rods, the diameter of the gear must be big. Therefore this causes the expansion of the cartel, increases costs and decreases the ergonomic feature of the machine by means of making the machine heavier.

Due to abovementioned disadvantages, a development is required to be made in the present art.

Aim of the Invention

The aim of the invention is to provide less noise and more comfortable usage by providing required shaking motion at lower speeds. Due to the curved structure of the connecting rods, the area of the comb is extended and the sizes of the used cartel are reduced. In addition to this, reduced cartel sizes also decrease the production costs. A required advantageous usage is provided to the user by means of enabling freedom of motions to combs with only one machine.

Detailed Description of the Invention

The olive harvesting machine provided for fulfilling the aim of this invention is shown in the accompanying figures.

Among these, in the following figures;

Figure 1-2: are the front views of the inventive harvesting machine (motion position No 1-2)

Figure 3-4: are the front views of the inventive harvesting machine (motion position No 3-4)

Figure-5: is the side view of the inventive harvesting machine

Figure-6: is the side view of the inventive harvesting machine

Figure-7: is the perspective view of the gear box of the inventive harvesting machine.

The parts that compose the inventive olive harvesting machine are enumerated in the Figures as the following.

1- Drive (Electrical motor)

- 2- Drive gear
- 3- Wheel gear
- 4- Shaft gear
- 5- Timing gear
- 6- Curved connecting rod
- 7- Cartel
- 8- Comb
- 9- Stick

The main elements of the inventive olive harvesting machine are shown in Figure 7 as Drive gear(2), Wheel gear (3) and in Figure 1 as the Shaft gear (4), Timing gears (5) and curved connecting rod (6).

(Figure-7) The Drive (Electrical Motor) (1) as the source of the rotational motion is positioned in a manner such that it is positioned behind the harvesting machine. On one end of the drive (1), the drive gear (2) is engaged in a manner such that it is positioned on the front portion of the harvesting machine. On the drive gear (2), a wheel gear (3) is engaged in a manner such that it transmits the motion received from the electrical motor.

(Figure-1) Wheel gear (3) is engaged to the shaft gear (4) which is located on the front portion of the harvesting machine by means of a shaft which passes through its center. The shaft gear (4) is positioned on the middle of two timing gears (5) in a manner such that it is at a lower position than the centers of them. Therefore a motion can be transmitted to two separate gears by means of one gear positioned in the middle as one of the main aspects of the invention.

(Figure-1) The curved connecting rods (6) are engaged in an articulated manner in a manner such that it remains between the centers and the external walls of the timing gears (5). Accordingly, the rotation of the timing gear (5) enables the connection point of the curved connecting rod (6) to move horizontally in a planar manner. The other ends of the curved

connecting rods (6) are engaged in an articulated manner to the ends of the combs (8) that facing inwards.

(Figure-6) The centers of the combs (8) are fixed at the horizontal and vertical axis by means of the cartel (7) attached to the front surface of the olive harvesting machine, however motion at their own axes is provided. From the central point, the sticks (9) positioned on the combs (8) which is allowed to move around its own axis are used for the process of shaking the branches during olive harvesting.

The motion transmission and working principles of said invention is as the following:

The motions received from the electrical motor (1) are transmitted to the drive gear (2). The motion made by the drive gear (2) around its own axis is transmitted to the wheel gear (3) to which it is engaged. The shaft gear (4) which is engaged with the wheel gear (3) by means of a shaft transmits motion to the timing gears (5) which are the main aspects of the invention.

The connecting rods which are used in the other harvesting machines are designed in a curved manner in the inventive olive harvesting machine. The curved connecting rods (6) are engaged to the timing gears (5) by means of the connection pins. When one end of the connecting rod is engaged to the timing gear and the other end is engaged to the comb (8), the engagement center on the comb (8) is not included within the projection of the engagement center of the timing gear (8) due to the fact that the connecting rod is curved.

This allows more opportunity of movement to the comb (8) and the required cartel (7) for the desired motion shifts to the center of the comb (8) engagement point. By this means the size of the cartel (8) is reduced.

Connecting rods start to move in horizontal and vertical axes together with the rotation of said gears and they transmit the motion to the combs to which they are engaged with their other ends by means of the pins.

By means of using two timing gears (5), motion variations are provided to the olive harvesting machine by means of adjusting connection points of the timing gears of the

curved connecting rods (6) before the motion, an advantageous working condition is provided for the user by enabling freedom of motion of the combs with a single machine.

In Figure 1 and 2, it provides simultaneous right and left movement of the timing gear and connecting rods and combs which are mutually positioned at the lower and upper dead points. In this manner because the connecting rods move simultaneously to the same direction, the machine operates in a balanced manner however the combs do not make shearing.

In Figure 3 and 4, the timing gear, connecting rods and combs positioned at upper and lower dead points at the same time move in a manner such that simultaneously while one of them moves to the right the other one moves to the left. An operation mode like a scissor is obtained. The connecting rod moves in this manner and the arms move in the opposite manner at the same time, the machine makes shearing however it does not operate in a balanced manner.

Among the comb movement directions, the advantageous position can be desired; if it is a movement to the same direction or to the opposite direction, the timing gear can be positioned according to the lower and upper dead points and interim variations. Accordingly this enables freedom of movement in the operation of the machine.

CLAIMS

1. The invention is an olive harvesting machine, **characterized in that**; it comprises the following;

- 5 - a shaft gear (4) which transmits the motion received from the wheel gear (3) to the timing gear (5),
- at least two timing gears (5) which transmits the motion received from the shaft gear (4) to the curved connecting rods (6)
- and curved connecting rods (6) which transmits the final motion to the
- 10 combs (8).
2. A shaft gear (4) according to claim 1, **characterized in that**; it is engaged in a manner such that the movement of rotating around its own axis is transmitted to all timing gears at the same time which are located on the machine to which the connecting rods are connected separately.
- 15 3. A shaft gear (4) according to claim 1, **characterized in that**; it is engaged between at least two timing gears (5).
4. A curved connecting rod (6) according to claim 1, **characterized in that**; it has a curved structure.
5. At least two timing gears (5) according to claim 1, **characterized in that**; in order to
- 20 enable freedom of movement to the combs of the harvesting machine, they are engaged in a manner such that the positions of the connecting rods can be adjusted.

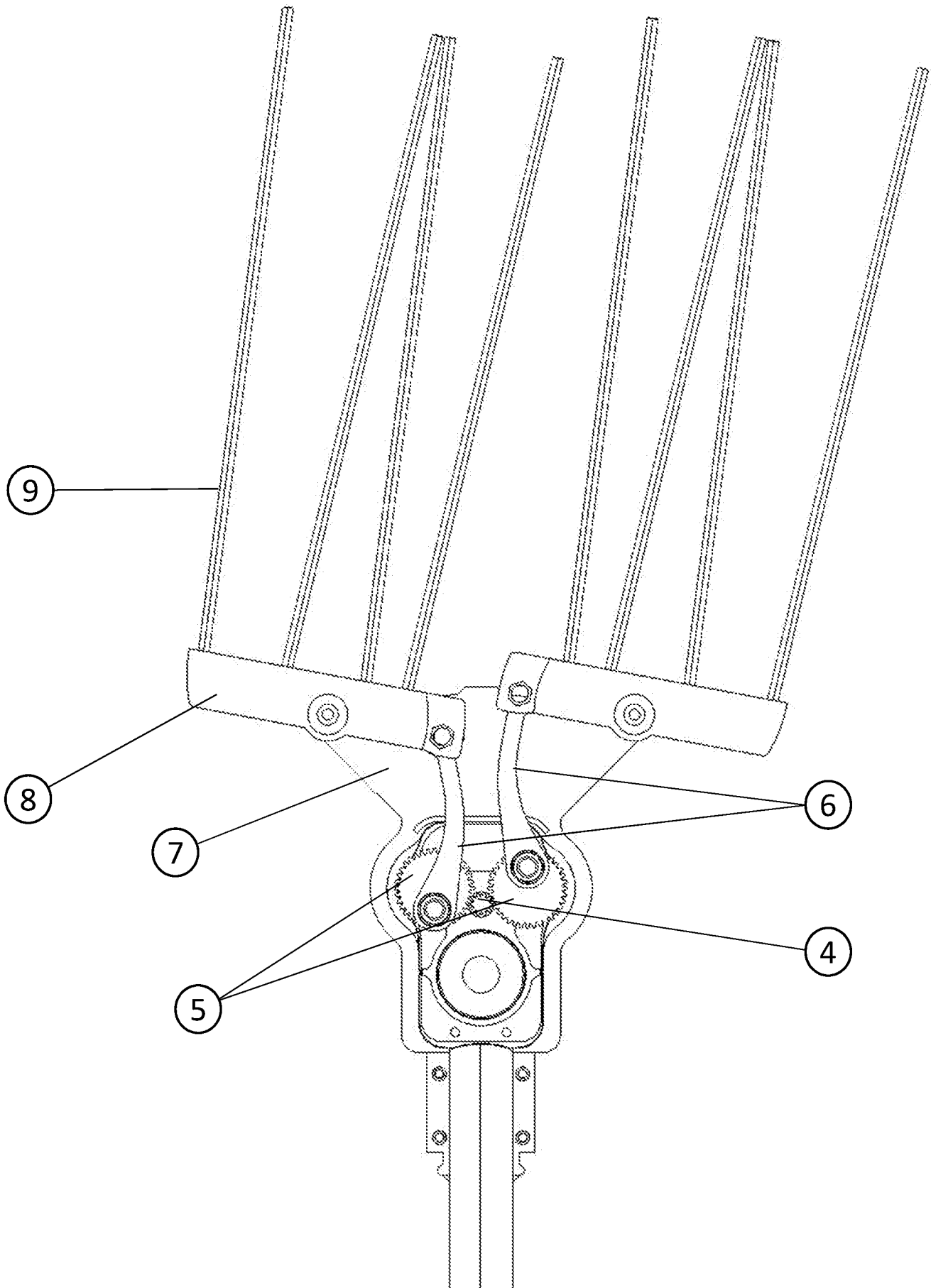


FIGURE - 1

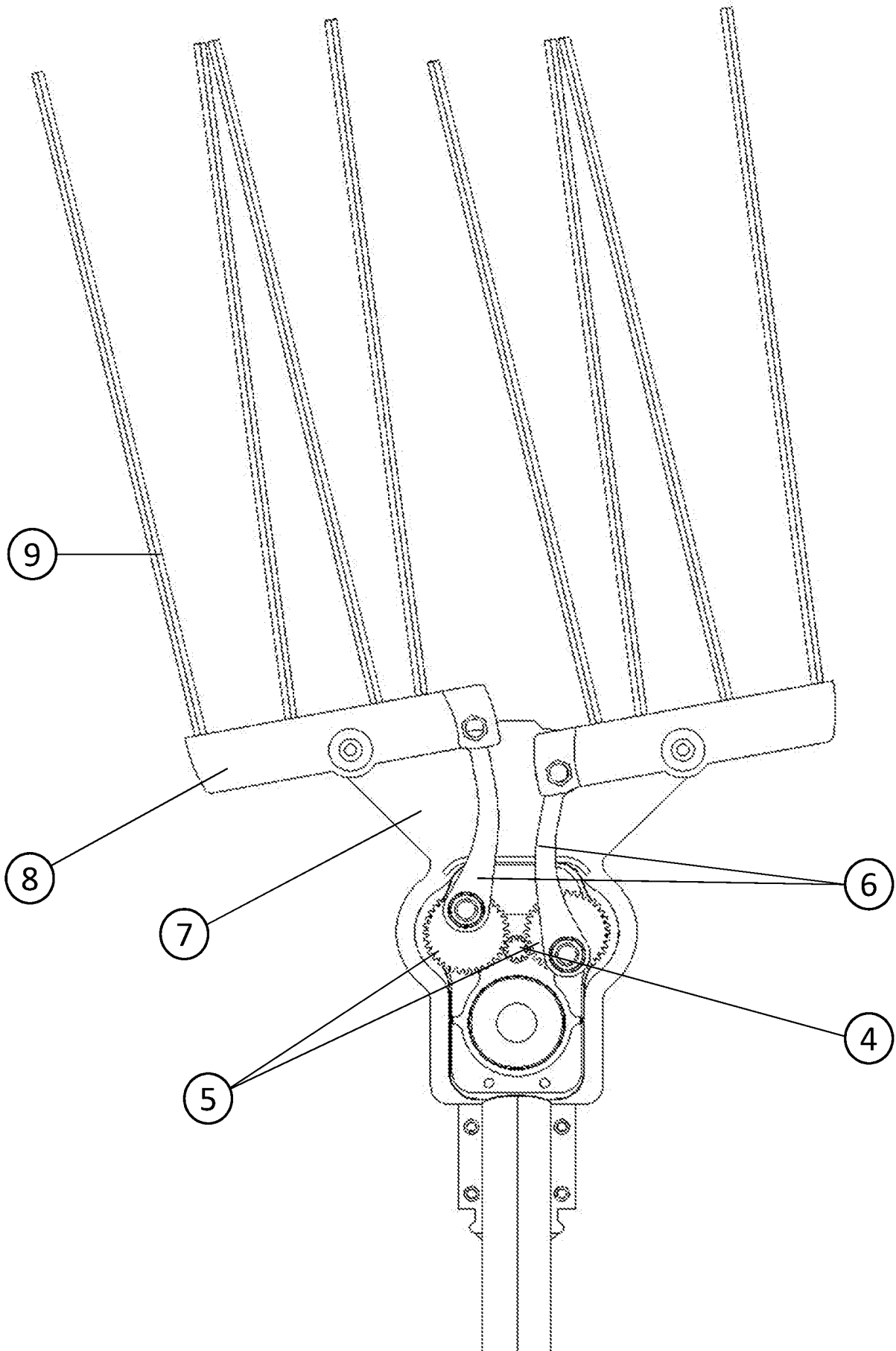


FIGURE - 2

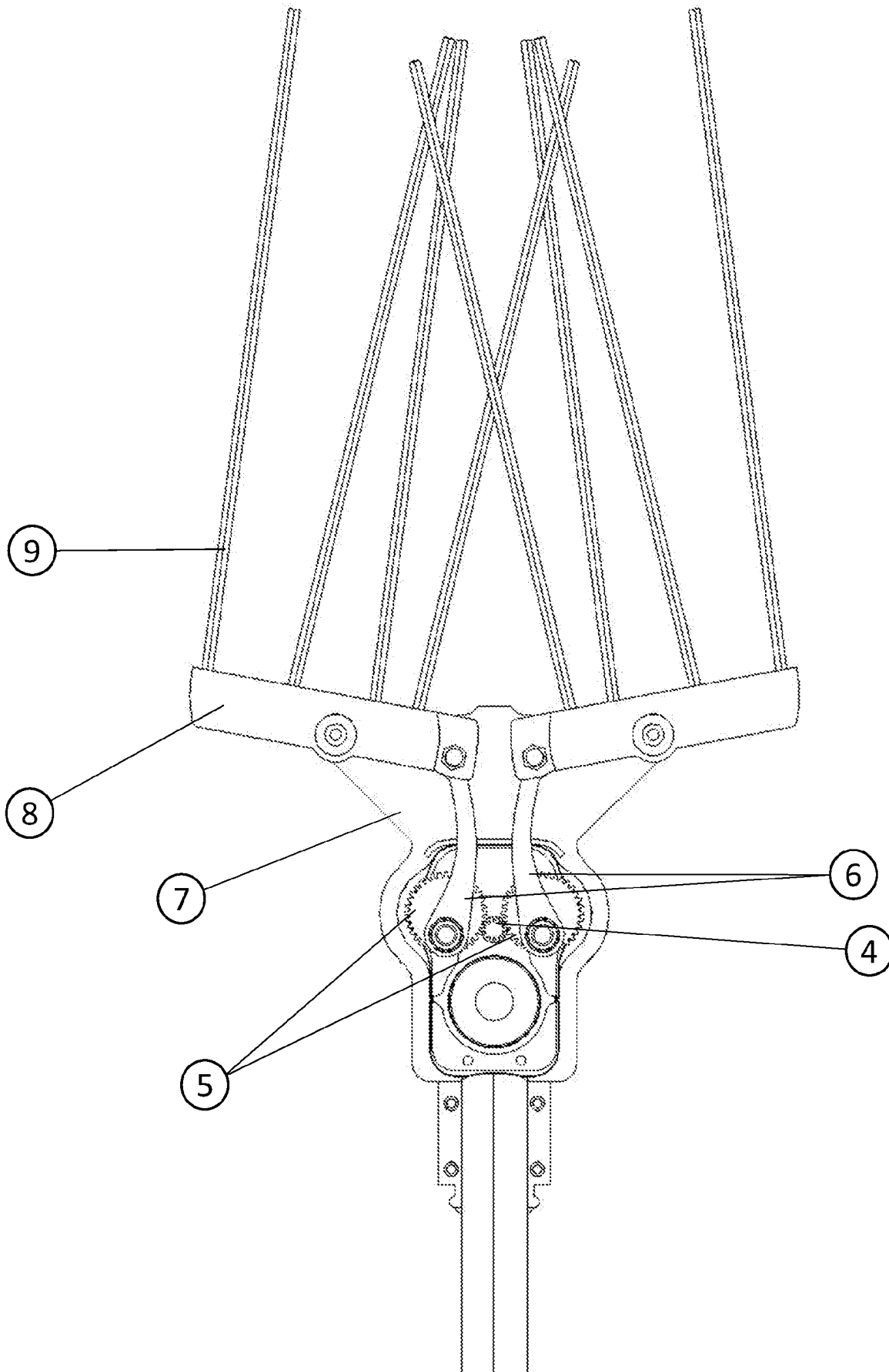


FIGURE - 3

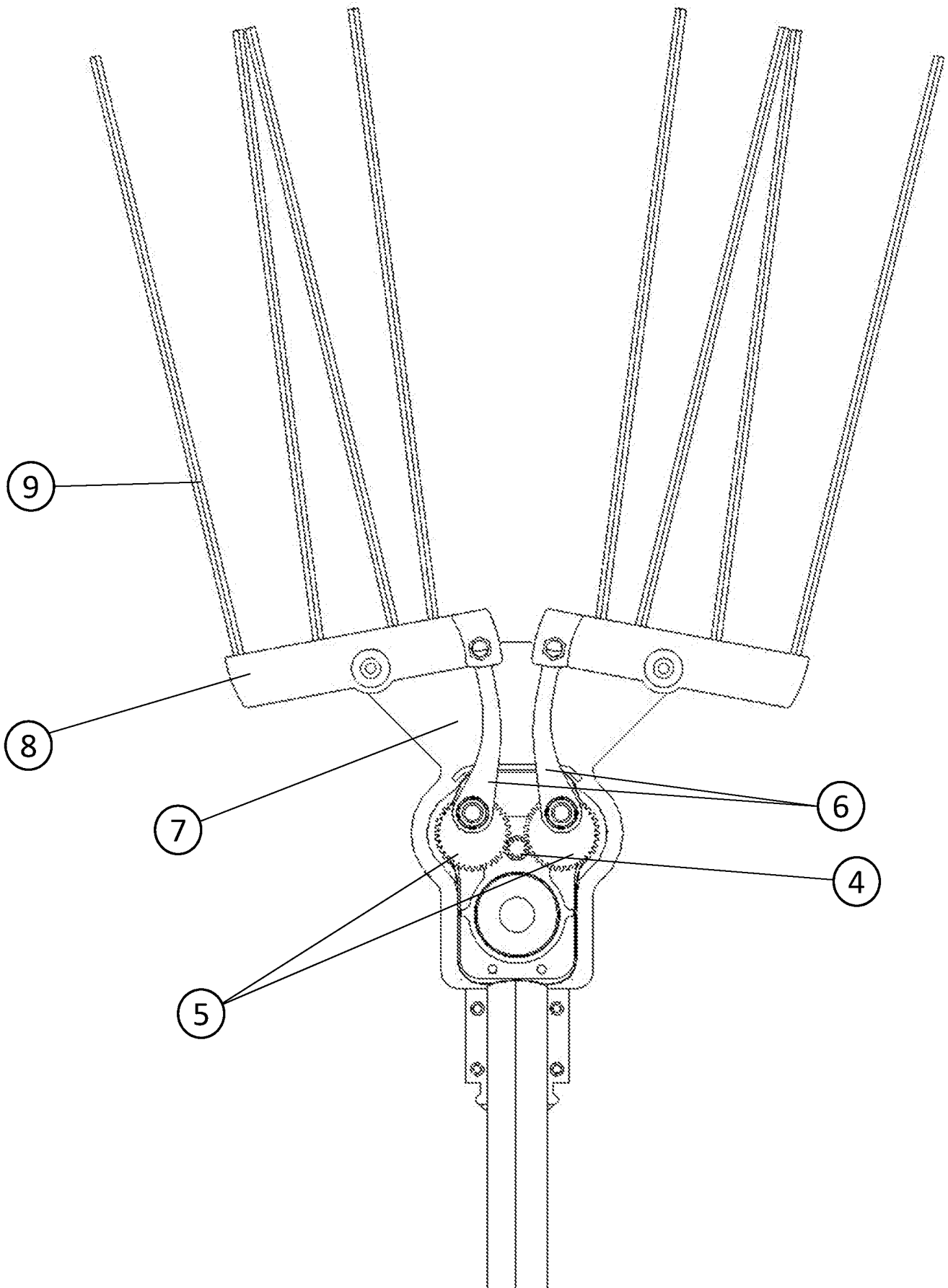


FIGURE - 4

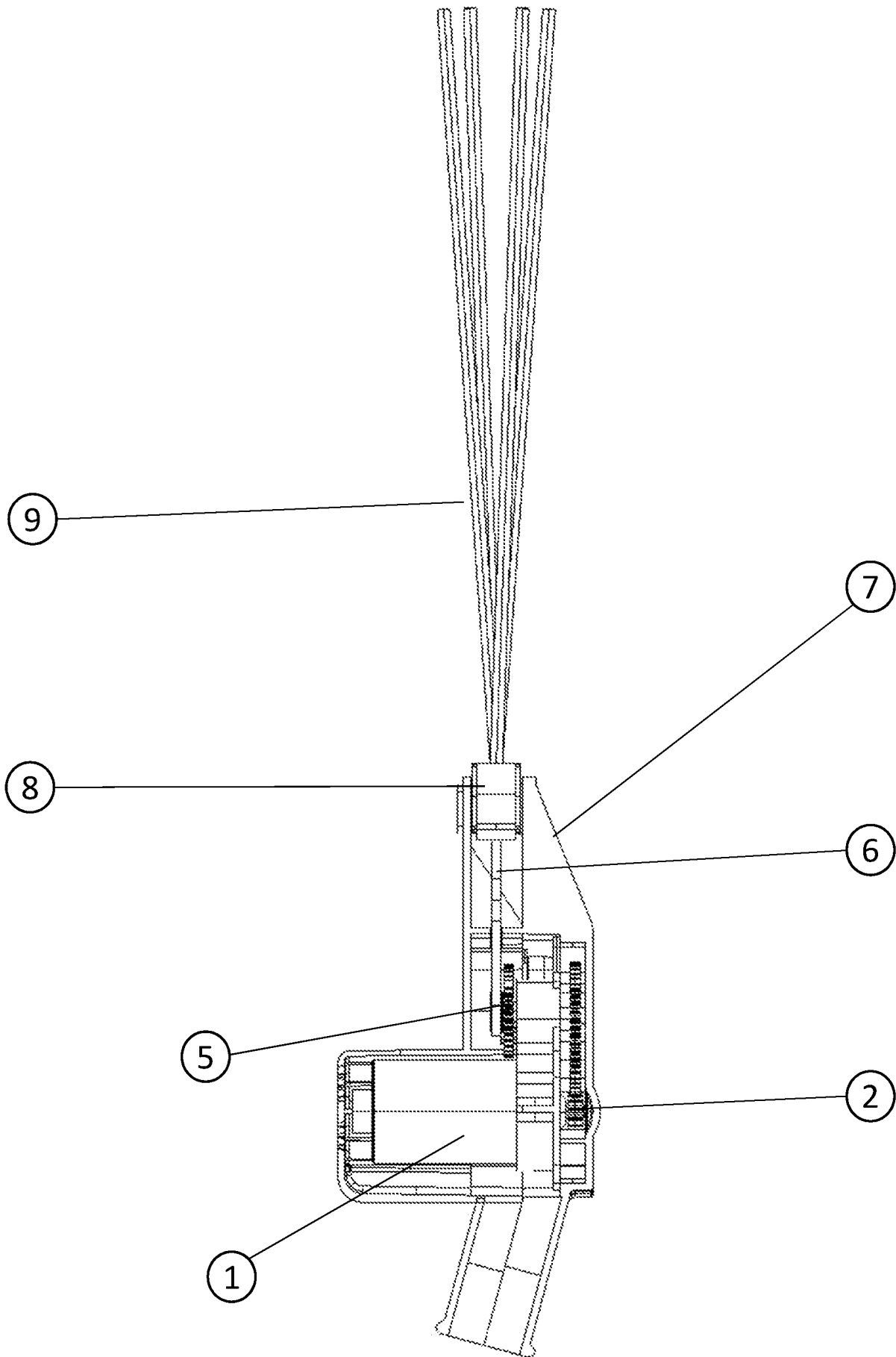


FIGURE - 5

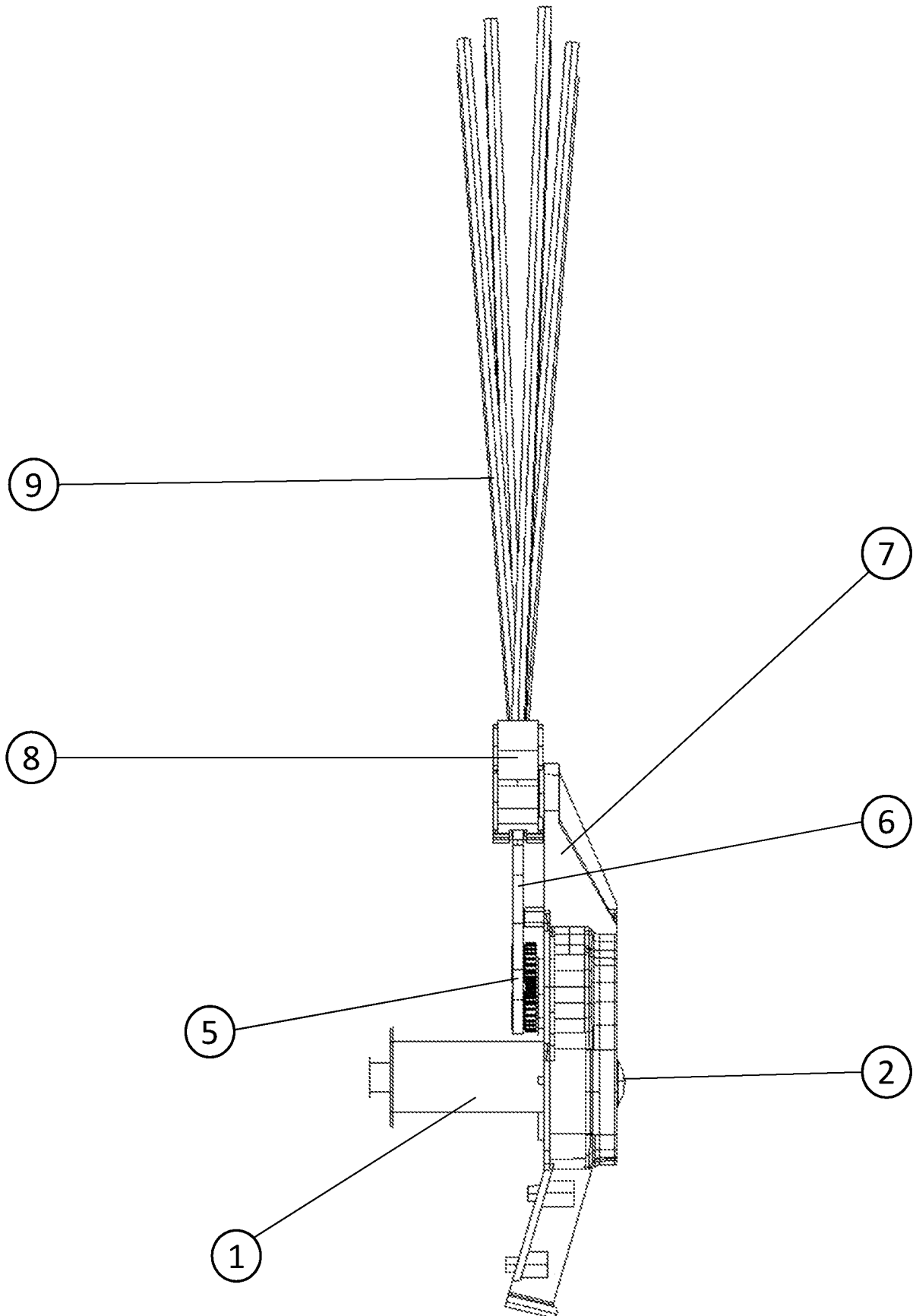


FIGURE - 6

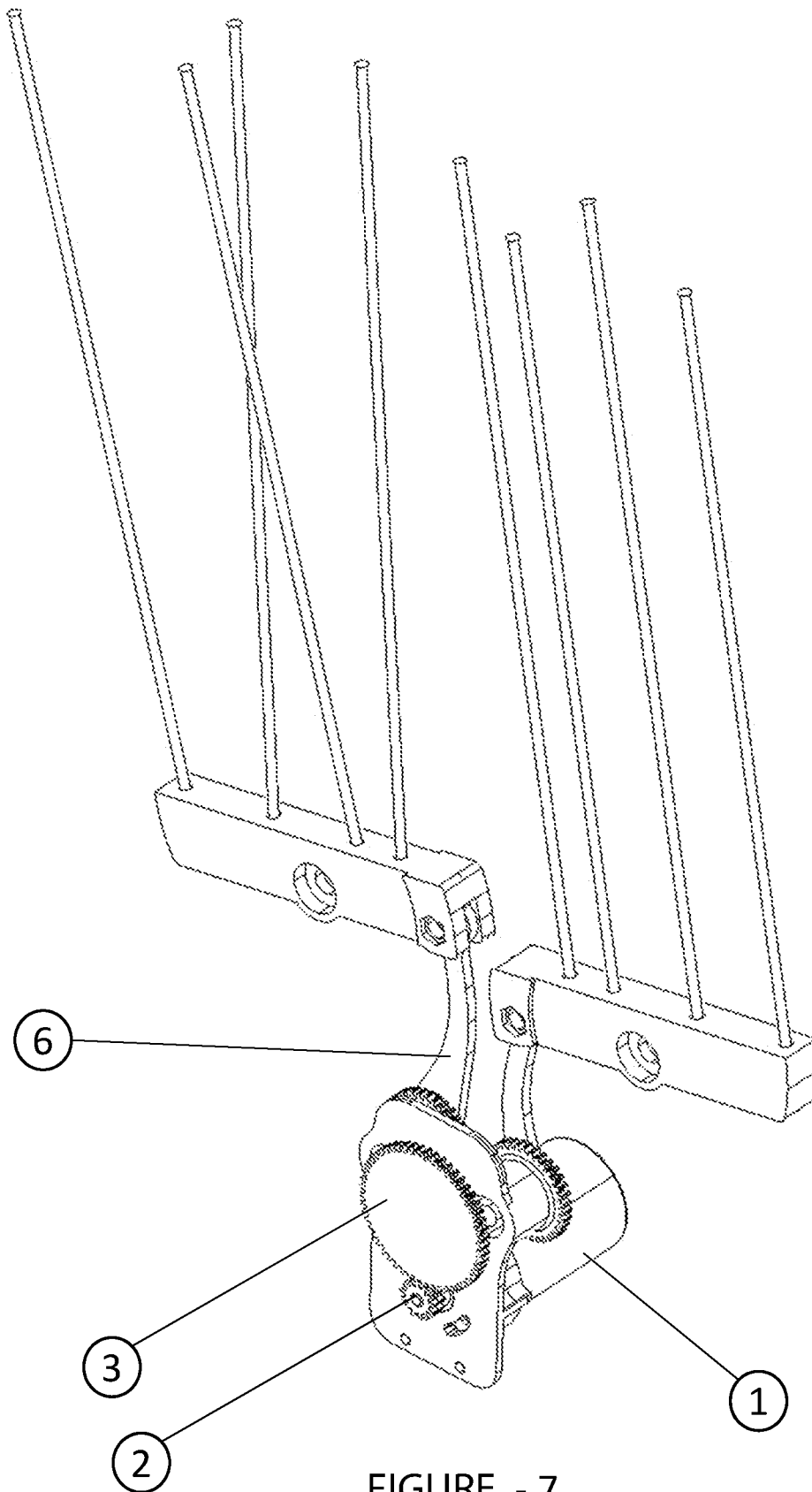


FIGURE - 7