employed for attachment to a table tennis table and for feeding balls to a robot ball server. The net structure includes a plurality of arms extending radially from a central member and netting suspended between the arms. The netting has a lower edge, which is cooperatively connected with a trough device for receiving balls that fall from the netting. The trough is disposed to feed the balls to the robot serving device. The disclosures in the above described patents are incorporated by reference herein.

While the devices previously known to the art are functional and useful, they can be limited in the way the ball is discharged from the robot head. That is for the most part they are panning heads that move back and forth and vary the speed of trajectory and the like. However, they have limited ways of varying the trajectory of the discharged ball, the angle of trajectory, the spin on the ball and so forth, primarily due to the weight of conventional panning heads.

It is desirable, therefore, to have a sophisticated server device for sequentially serving a plurality of balls to the player employing a relatively simple, inexpensive lightweight design with improved or expanded trajectories of discharge.

SUMMARY OF THE DISCLOSURE

Briefly stated, a robot table tennis ball server assembly is disclosed.

According to a first aspect of the present invention, there is disclosed a robot server assembly for serving table tennis balls comprising: a body with an upper end and a lower end, said body defining an internal ball path; ball pickup apparatus for introducing balls into the internal ball path at the lower end of the body; a ball guide at the upper end of the back panel, said ball guide having an open bottom in communication with the internal ball path and an open front; a serving head assembly attached to the upper end of the body having a ball discharge tube in communication with the open front of the ball guide; a pair of opposed discharge wheel operatively associated with the discharge tube; a plurality of gears operatively associated with the serving head; and at least one servo motor

operatively associated with at least one of said plurality of gears to actuate rotation of said gear; whereby actuation of a least one of said gears affects 180° rotation of the serving head about a longitudinal axis of the serving head; and whereby actuation of at least one of said gears affects up and down movement of the serving head; whereby actuation of at least one of said gears affects side to side movement of the serving head.

In one ~~aspect~~embodiment, the robot table tennis ball server assembly comprises a serving head assembly that ejects the table tennis balls through a discharge tube. In one ~~aspect~~embodiment, the serving head assembly has full movement, i.e. the head can move along a vertical path, a horizontal path and can rotate 360° around the longitudinal axis of the discharge tube.

In one ~~aspect~~embodiment, the serving head assembly comprises a ball discharge tube, a top discharge wheel and an opposed bottom discharge wheel, both of which extend at least partway into the tube. The discharge wheels comprise a lightweight plastic material. Each of the discharge wheels includes an axle and an outer rim at each end of the axle. Each rim seats a silicon O-ring. In one ~~aspect~~embodiment, the axle of the top wheel is narrower

than the axle of the bottom wheel. Moreover, the axle and rims of the bottom wheel define a substantially concave configuration, which better seats and stabilizes a ball. The top wheel grips the ball with a narrower grip than the bottom wheel, stabilizing the ball and allowing more accurate control of expulsion including desired speed and spin.

In one ~~aspect~~embodiment, the discharge tube has a posterior section and an overlapping anterior section with an O-ring bearing at the junction of the two sections to provide a smooth, lightweight surface for rotational movement of the server head about the longitudinal axis of the discharge tube.

In another ~~aspect~~embodiment, the operative elements of the serving head assembly comprise lightweight materials, which allow a wide range of movements of the serving head by small servo motors.

In another ~~aspect~~embodiment, the movement of the server head is controlled by a wireless unit, which can be handheld or mounted on the table. In one aspect, the unit is a programmable tablet computer.

Yet another ~~aspect~~embodiment of the disclosure is a robot server assembly that can be expanded to accept a net assembly or trough assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG.1 is a perspective view of the robot table tennis ball server assembly in accordance with the present disclosure positioned adjacent to a programmable tablet controller;

Fig. 2 is a front plan view of the serving head;

Fig. 3 is a left side elevational view of the serving head and gear assembly;

Fig. 4 is a right side elevational view of the serving head and gear assembly;

Fig. 5 is a top plan view with the oscillator cover removed and positioned upside down showing the bottom plan of the oscillator cover, panning drive gear and servo motor;