AN AUTOMATIC DEVICE FOR DISPENSING FOOD KEPT IN A LIQUID MEDIUM¹

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In working with operant conditioning of fish, it has been found desirable to use live food as a reinforcer. Present automatic feeders could not be used because live food for fish must necessarily be kept wet. The feeder we have designed keeps the food in a small vial of water until it is dispensed. We have used the feeder to dispense white worms (*Enchytraeus albidus*), but it can also be used for pieces of meat, brine shrimp, or for other substances that must be kept in a liquid medium.

A general view of the feeder is shown in Fig. 1. Forty-four glass vials (4-milliliter Cenco) are attached to the circumference of a Plexiglas disc with equally spaced individual pivots. The Plexiglas disc with the vials is attached to a rotating shaft. A masonite friction wheel (E in Fig. 1) is attached to the shaft at a lower point. A rubber cylinder on the shaft of a

Figure 1. General view of feeder.

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motor (Merkle Korff Gear Co., Chicago 25BF 4209 UAS with built-in brake) presses against the bottom of the masonite disc. The motor shaft is parallel to the plane of the disc, and the radial location of the cylinder on the masonite disc can be adjusted to vary the speed of rotation of the masonite disc and Plexiglas disc assembly.

Each pivot on the Plexiglas disc consists of a T-shaped pin (Oakville Co., Waterbury, Conn.) that swings freely between two small pieces of Plexiglas mounted on the Plexiglas disc. One arm of the pin is inserted in a small hole in each of the two pieces of Plexiglas, and the pieces are held together by a brass screw (Fig. 2 and 3). The pivot mechanism can be

Figure 2. Diagram of Plexiglas disc and pivot assembly.

easily removed from the disc and replaced in the event of damage. The 1.5-inch-long leg of the T pin is attached to a brass collar that holds the dispensing vials. The brass collar is a short piece of brass tubing of diameter slightly less than that of the vials. The brass tube is slit longitudinally, so that a vial can be forced into it and will be held firmly. The leg of the T pin is inserted through a small hole drilled through the brass collar, and the collar and pin are soldered together so that the base of the vial in the collar is parallel to the arms of the T.

The vials pivot radially outward. When the vials are not discharging their contents, they are kept in an upright position by a ring of brass rod extending around the disc (A in Fig. 1, Fig. 2). The ring is immovable; it is broken at one point (B in Fig. 1) and a small section has been removed. When a vial passes this point, it pivots outward and downward through an angle of approximately 90 degrees, discharging its contents. A small plastic backstop is used to reduce chatter (D in Fig. 1). The vials are returned to the upright position by the other arm of the brass ring that is bent down (C in Fig. 1). As Fig. 1 shows, the vials are gradually restored to the upright position over a distance of about 80 degrees of arc as the Plexiglas rotates. Thus, 37 of the 44 vials are in an upright position at any given time.

Forty-four roundhead brass screws, with head facing down (A in Fig. 2), are mounted in a circle concentric with the circumference of the Plexiglas disc. One screw corresponds to each

Figure 3. Pivot assembly, viewed from below.

pivot. A roller-spring microswitch (F in Fig. 1) mounted below the Plexiglas disc is adjusted so that the roller is always tangent to the circle formed by these screws, and the switch is activated each time a screw head depresses the roller. The signal thus produced is used in a two-relay circuit to insure that the feeder discharges the contents of only one vial when an electrical impulse is sent into the circuit.

The wooden base for the feeder has been made quite small and is placed asymmetrically, so that the point at which the vial discharges its contents clears the corresponding side of the base. In most applications, the food can be discharged directly into the experimental tank. In a few applications, we have used a short aluminum chute to conduct the food and water into the experimental container.

The number of vials in the apparatus is optional; and with appropriate changes in size, any number can be accommodated. The apparatus, as described here, has performed very satisfactorily. The cost of the feeder, not including labor, is less than \$40.

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