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(54) **AC POWERED ALL WEATHER AUTOMATIC GRANULAR FEEDER**

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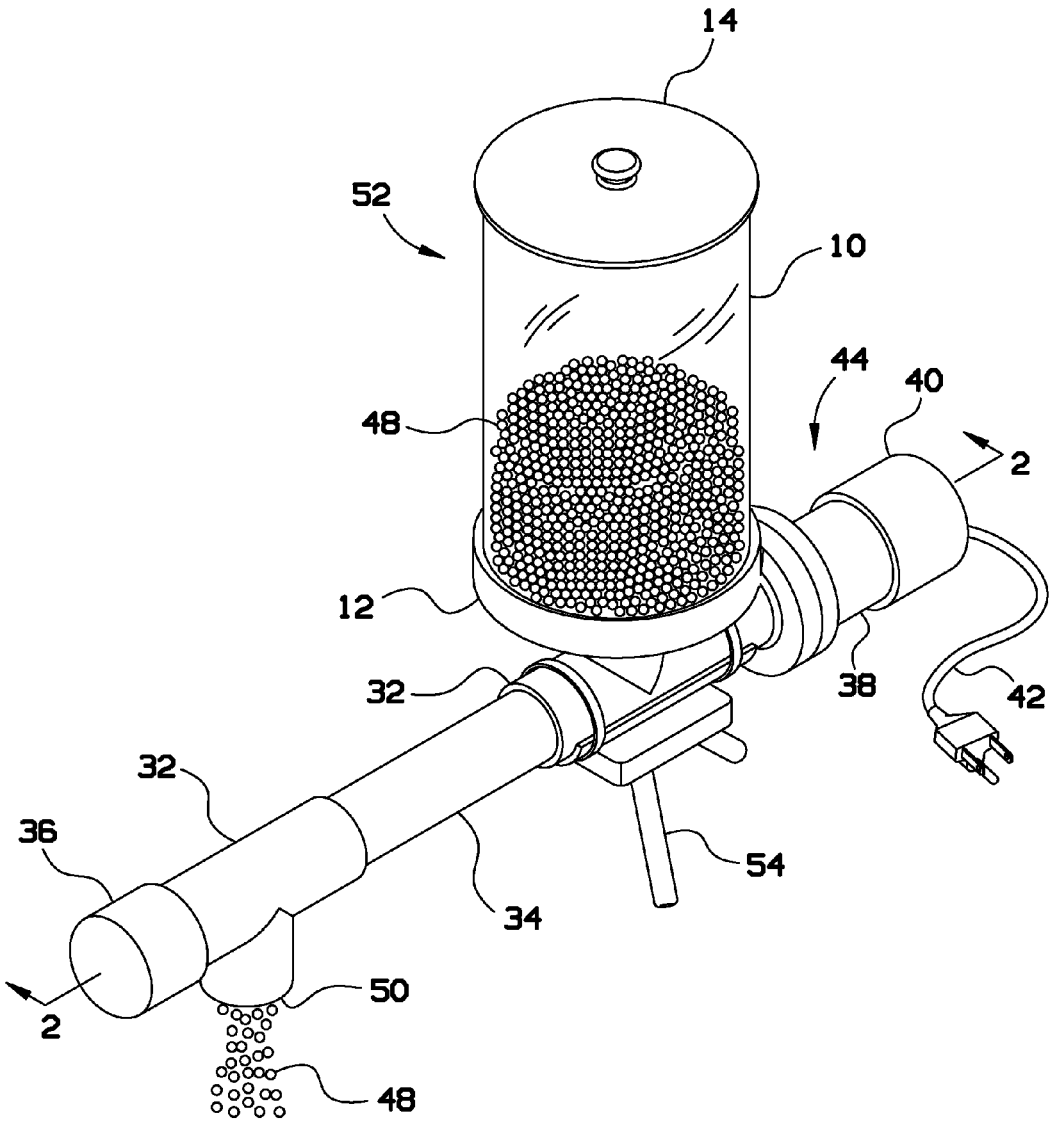
(57) **ABSTRACT**

An automatic, all-weather, AC-powered feeder can be used to supply feed to a fish pond, for example. The feeder does not clog and can be set to dispense an exact amount of food periodically. The feeder includes a hopper for holding food, such as a granular fish food. A power feed auger can be powered by an electric motor to carry food from the auger, down a main pipe, to a dispensing hole. Therefore, the hopper is not required to be positioned over the pond, but, instead, only the main pipe is disposed over the pond to release food from the dispensing hole.



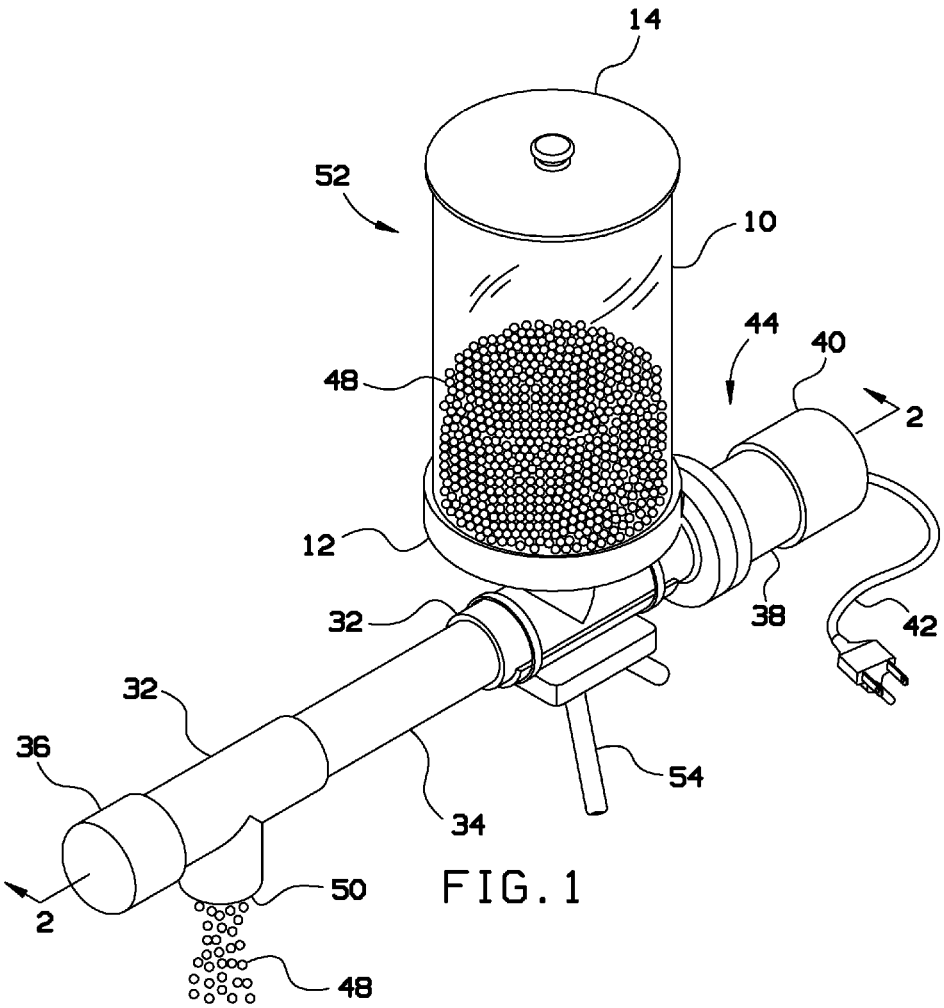


FIG. 1

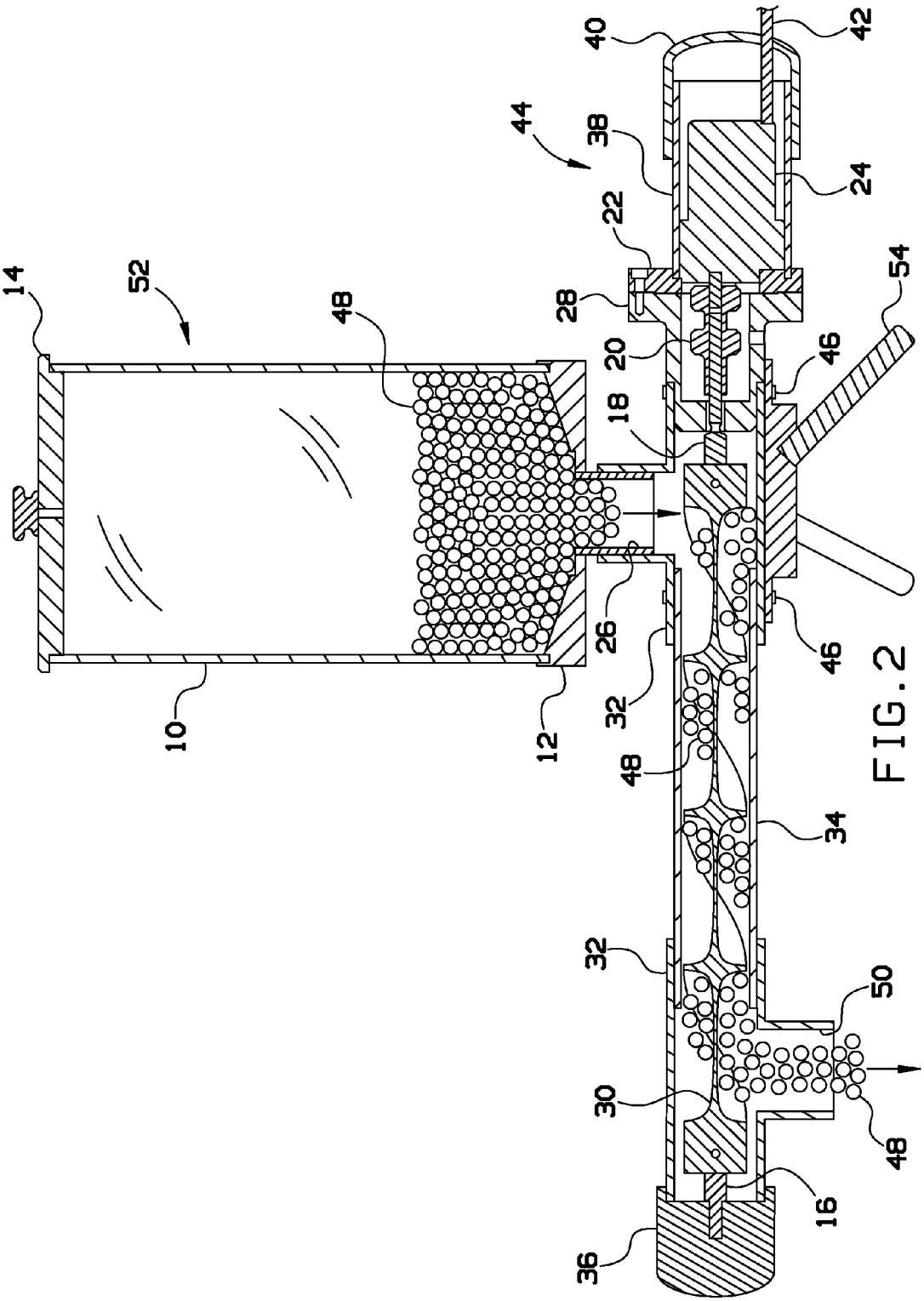

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FIG. 2

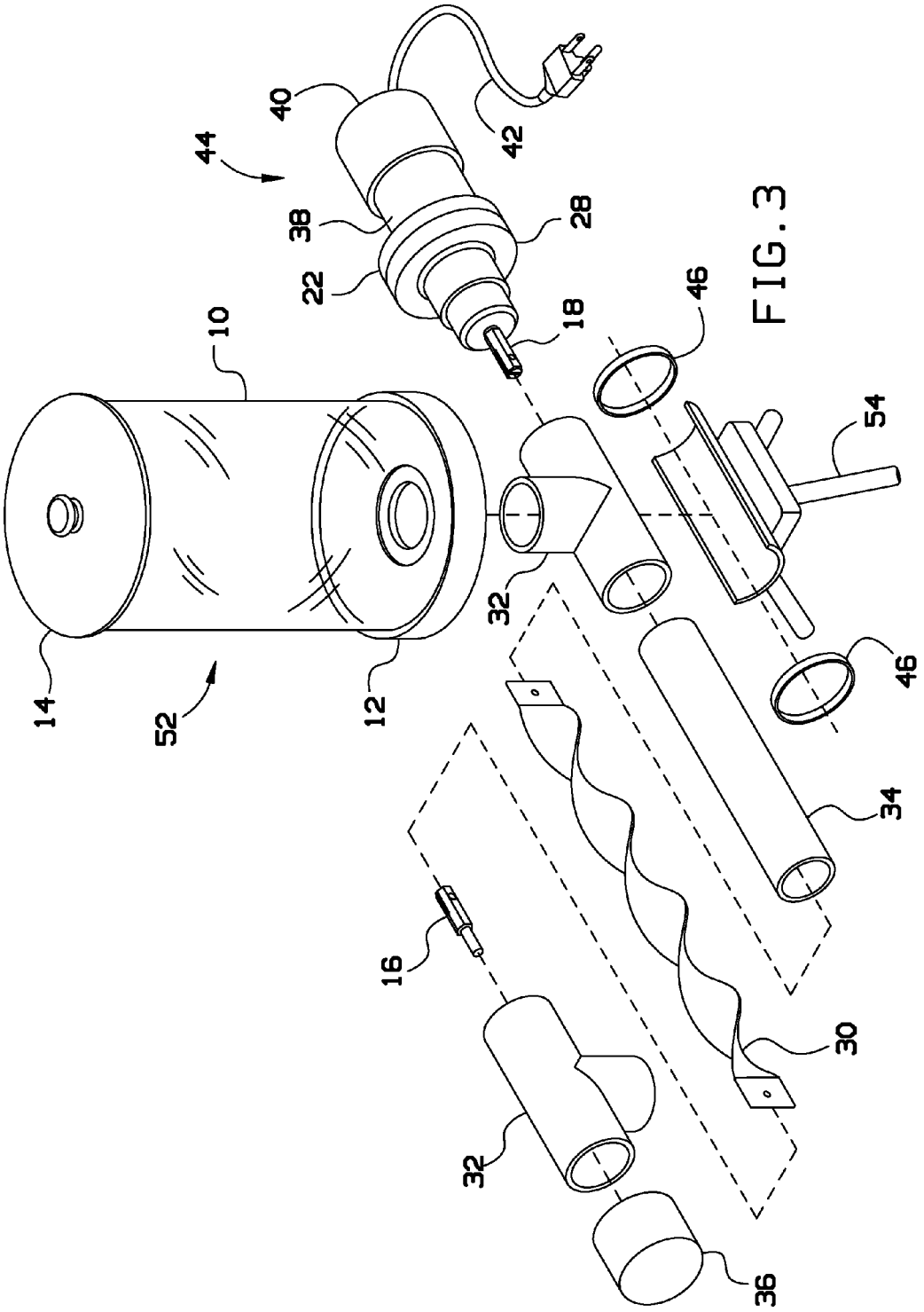

FIG. 3

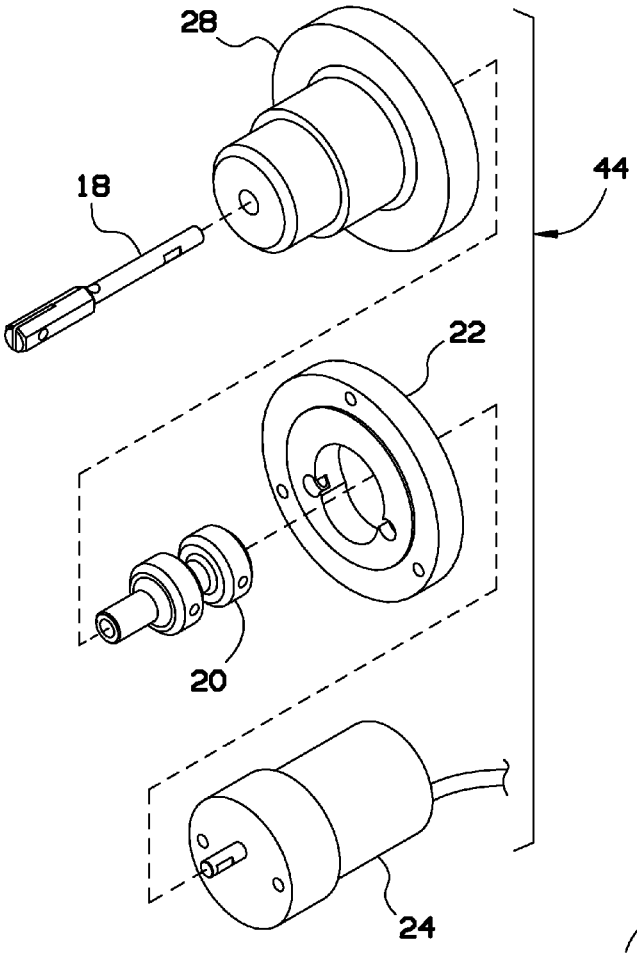

FIG. 4

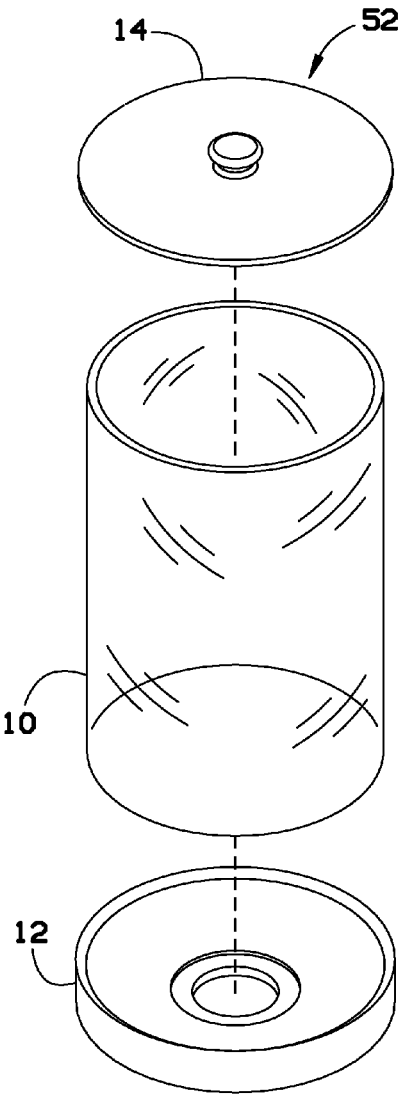

FIG. 5

AC POWERED ALL WEATHER AUTOMATIC GRANULAR FEEDER

BACKGROUND OF THE INVENTION

[0001] The present invention relates to feeders and, more particularly, to an all-weather, alternating current (AC) powered automatic granular feeder that is particularly suited for distribution of fish food for outdoor fish ponds, such as decorative koi ponds, for example.

[0002] Fish ponds have been increasing in popularity. Many homeowners and businesses install these ponds, which can vary in size from a few hundred gallons to thousands of gallons. While an attractive addition, especially when eye-catching and expensive koi fish are placed in the pond, there is a need to feed the fish, often daily when the fish are active.

[0003] Fish feeding can be problematic. Where multiple people may be responsible for the pond, the fish can be fed too much or too little food. Even when only one person is responsible for feeding, they may be on vacation, forget, or double feed when then can't recall whether a certain day's feeding has occurred.

[0004] Home-based ponds can become an issue when the members of the household go away for a vacation. Often, they have to rely on others to feed the fish, which can be unreliable. There are limited options for automatically supplying food to a pond.

[0005] Some feeders include a small hopper and a rotating shaft with a plurality of flaps attached thereto. The shaft is disposed at a lower opening of the hopper and the flaps seal this opening when not turning. In theory, a battery-powered motor would turn the shaft, turn the flaps, and permit an amount of food to be released from the hopper. These feeders, however, often jam, as the battery-powered motor is not strong enough to turn the shaft and flaps when the hopper is filled. Moreover, once jammed, the shaft can become disengaged from the flaps, thereby allowing the shaft to turn without turning the flaps and not releasing food as desired.

[0006] Other battery powered feeders can use vibrations to release food from a hopper. While these feeders do not suffer from issues with turning shafts, these feeders can release an unpredictable amount of food into the pond—from no food when the hopper gets jammed, to a full "dose" of food when the food is free-flowing, and any amount in between.

[0007] Many of the conventional automatic feeders simply drop food from their hopper. Therefore these feeders need to be disposed over the pond itself, decreasing the natural beauty of the pond and often requiring a separate support structure.

[0008] As can be seen, there is a need for an improved automatic feeder that can distribute a consistent amount of food into a pond while being weather proof and powered by reliable AC power.

SUMMARY OF THE INVENTION

[0009] In one aspect of the present invention, an automatic feeding device comprises a hopper assembly operable to hold food; a hopper bottom adapter having a food supply hole for release of food from the hopper assembly; a power feed auger receiving food released from the hopper assembly; a motor driving the power feed auger; a main pipe containing the power feed auger; and a food dispensing hole disposed at a distal end of the main pipe, wherein the power feed auger turns to move the food down the main pipe and out of the food dispensing hole during operation of the automatic feeding device.

[0010] In another aspect of the present invention, an automatic feeding device comprises a hopper assembly operable to hold food; a hopper bottom adapter having a food supply hole for release of food from the hopper assembly; a first tee, wherein an orthogonal connection point of the first tee receives food from the food supply hole of the hopper bottom adapter; a power feed auger receiving food released from the hopper assembly; a motor driving the power feed auger; a main hub connected to a first end of the first tee; a motor adapter connected to the main hub, the motor adapter supporting the motor; a motor cover pipe disposed from the motor adapter, covering the motor; a motor cover pipe cap disposed on an end of the motor cover pipe; a main pipe containing the power feed auger, the main pipe connected to a second end of the first tee; and a food dispensing hole disposed at a distal end of the main pipe, wherein the power feed auger turns to move the food down the main pipe and out of the food dispensing hole during operation of the automatic feeding device.

[0011] These and other features, aspects and advantages of the present invention will become better understood with reference to the following drawings, description and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. **1** is a perspective view of an automatic feeder according to an exemplary embodiment of the present invention;

[0013] FIG. **2** is a cross sectional view taken along line **2-2** of FIG. **1**;

[0014] FIG. **3** is an exploded perspective view of the automatic feeder of FIG. **1** with all fasteners and food pellets removed for clarity;

[0015] FIG. **4** is an exploded perspective view of a motor/drive assembly of the automatic feeder of FIG. **1**; and

[0016] FIG. **5** is an exploded perspective view of a food hopper assembly of the automatic feeder of FIG. **1**.

DETAILED DESCRIPTION OF THE INVENTION

[0017] The following detailed description is of the best currently contemplated modes of carrying out exemplary embodiments of the invention. The description is not to be taken in a limiting sense, but is made merely for the purpose of illustrating the general principles of the invention, since the scope of the invention is best defined by the appended claims.

[0018] Broadly, an embodiment of the present invention provides an automatic, all-weather, AC-powered feeder that can be used to supply feed to a fish pond, for example. The feeder does not clog and can be set to dispense an exact amount of food periodically. The feeder includes a hopper for holding food, such as a granular fish food. A power feed auger can be powered by an electric motor to carry food from the auger, down a main pipe, to a dispensing hole. Therefore, the hopper is not required to be positioned over the pond, but, instead, only the main pipe is disposed over the pond to release food from the dispensing hole.

[0019] Referring now to FIGS. **1** through **5**, an automatic feeder can include a hopper assembly **52** for containing food **48**. The hopper assembly **52** typically includes a transparent, cylindrical member **10**, a hopper bottom adapter **12** and a hopper top cover **14**. The hopper top cover **14** can provide a

weather proof cap for the cylindrical member **10**. The hopper bottom adapter **12** can provide a sloped bottom surface (see FIG. **2**) that slopes a food pellet supply hole **26** formed in the hopper bottom adapter **12**. The food pellet supply hole **26** can fit into or be formed integrally with a tee **32**, connecting with the orthogonal connection point of the tee **32**.

[0020] A main hub **28** can attach to a first end of the tee **32**. A motor/drive assembly **44** can include a motor adapter **22** that can mount to the main hub **28**. The motor adapter **22** can support a motor **24**. Typically, the motor **24** is a direct current (DC)-powered motor. The motor **24** can be housed in a motor cover pipe **38** running from the motor adapter **22** and terminating with a motor pipe cap **40**. A power cord **42** for the motor **24** can extend out of the motor pipe cap **40**. In some embodiments, an AC to DC transformer can be disposed at the plug end of the cord and the power cord **42** can carry low voltage (such as 12-volt or 24-volt, for example) direct current to the motor **24**. In other embodiments, an AC to DC transformer can be disposed in the device itself and the power cord **42** can carry AC power to the device. In this configuration, should a replacement motor be needed, the user can simply disconnect the motor adapter **22** from the main hub **28** to remove the motor for replacement.

[0021] A main pipe **34** can attached to a second, opposite end of the tee **32**. The main pipe **34** can be from about 12 to about 48 inches long, for example, and can include a second tee **32** disposed therein. The orthogonal connection point of the second tee **32** is typically 180 degrees from the orthogonal connection point of the tee **32** where the hopper bottom adapter **12** connects. A main pipe cap **36** can be disposed on the end of the second tee **32** (or on a short pipe that connects the second tee **32** with the main pipe cap **36**).

[0022] The feeder can include a feeder stand **54**. The feeder stand **54** can take various configurations, provided that it can support the feeder. For example, the feeder stand **54** can include a plurality of stand straps **46** for securing the feeder thereto. The stand **54** can be free-standing, or could be mounted on a deck, in the ground, into concrete, or the like, to provide a stable support structure.

[0023] The motor **24** can be mechanically connected to a power feed auger **30**. In some embodiments, as shown in FIGS. **2** and **4**, a coupling **20** can be mounted in the motor adapter **22** and a drive shaft **18** can pass through the coupling **20** to connect with the motor **24** on one end of the drive shaft **18** and connect to the power feed auger **30** on the other end of the drive shaft **18**.

[0024] The power feed auger **30** can pass under the food pellet supply hole **26**, receiving food **48** from the hopper assembly **52**. As the motor **24** turns, the power feed auger **30** turns and drives the food **48** down the main pipe **34**, to the second tee **32** and out a food pellet dispensing hole **50** (which can be simply the orthogonal connection point of the second tee **32**, or could be a pipe (not shown) connected to the second tee **32**. The distal end of the power feed auger **30** can be supported by the main pipe cap **36** with an end shaft **16**.

[0025] In some embodiments, the motor **24** can be designed to slowly turn at a predetermined (or adjustable) speed, thereby continuously delivering a given quantity of food out of the food pellet dispensing hole **50**. In other embodiments, the motor **24** can be programmed to operate for a set amount of time, turn off for a set off-time, and repeat. This operation can mimic a user's manual feeding, for example, on a twice a day cycle. Appropriate programming hardware and/or software can be provided, as may be known in the art, to cycle the motor **24** appropriately.

[0026] While the Figures show an exemplary embodiment of the present invention, certain sizes and shapes can be re-configured within the scope of the present invention. For example, while the drawings show a cylindrical hopper assembly **52**, the hopper assembly could be made in various geometric or non-geometric shapes, such as square, triangular, rectangular, pyramidal, or the like. While the Figures show relative length of the main pipe **34**, and relative dimensions of the main pipe **34** and hopper **10**, for example, these relative sizes can vary. Typically, the main pipe **34** can be from about ¾ to about 2 inches in diameter, while the hopper can be from about 4 inches to about 12 inches in diameter and from about 6 inches to about 24 inches, or more, high. Of course, the sizes and shapes can be altered depending on application and user preference and such changes are contemplated within the scope of the present invention

[0027] It should be understood, of course, that the foregoing relates to exemplary embodiments of the invention and that modifications may be made without departing from the spirit and scope of the invention as set forth in the following claims.

What is claimed is:

1. An automatic feeding device comprising:
- a hopper assembly operable to hold food;
- a hopper bottom adapter having a food supply hole for release of food from the hopper assembly;
- a power feed auger receiving food released from the hopper assembly;
- a motor driving the power feed auger;
- a main pipe containing the power feed auger; and
- a food dispensing hole disposed at a distal end of the main pipe, wherein
- the power feed auger turns to move the food down the main pipe and out of the food dispensing hole during operation of the automatic feeding device.

2. The automatic feeding device of claim **1**, wherein the hopper assembly includes a hopper top cover providing a weather-proof cover for a hopper body.

3. The automatic feeding device of claim **1**, further comprising a first tee, wherein an orthogonal connection point of the first tee receives food from the food supply hole of the hopper bottom adapter.

4. The automatic feeding device of claim **3**, further comprising:
- a main hub connected to a first end of the first tee;
- a motor adapter connected to the main hub, the motor adapter supporting the motor;
- a motor cover pipe disposed from the motor adapter, covering the motor; and
- a motor cover pipe cap disposed on an end of the motor cover pipe.

5. The automatic feeding device of claim **4**, wherein the main pipe is connected to a second end of the first tee.

6. The automatic feeding device of claim **4**, further comprising a drive shaft extend through the main hub and the motor adapter to mechanically connect the motor with the power feed auger.

7. The automatic feeding device of claim **1**, further comprising:
- a main pipe cap disposed on a distal end of the main pipe; and

an end shaft connecting the main pipe cap with the power feed auger.

8. The automatic feeding device of claim **1**, further comprising a second tee disposed at a distal end of the pipe, wherein the orthogonal connection point of the second tee provides a food pellet dispensing hole, releasing food out of the automatic feeding device during operation thereof.

9. The automatic feeding device of claim **4**, further comprising a power cord passing through the motor cover pipe cap, the power cord operable for connect to an alternating current power supply.

10. The automatic feeding device of claim **1**, further comprising a stand for support the automatic feeding device.

11. An automatic feeding device comprising:

a hopper assembly operable to hold food;

a hopper bottom adapter having a food supply hole for release of food from the hopper assembly;

a first tee, wherein an orthogonal connection point of the first tee receives food from the food supply hole of the hopper bottom adapter;

a power feed auger receiving food released from the hopper assembly;

a motor driving the power feed auger;

a main hub connected to a first end of the first tee;

a motor adapter connected to the main hub, the motor adapter supporting the motor;

a motor cover pipe disposed from the motor adapter, covering the motor;

a motor cover pipe cap disposed on an end of the motor cover pipe;

a main pipe containing the power feed auger, the main pipe connected to a second end of the first tee; and

a food dispensing hole disposed at a distal end of the main pipe, wherein

the power feed auger turns to move the food down the main pipe and out of the food dispensing hole during operation of the automatic feeding device.

12. The automatic feeding device of claim **11**, further comprising a drive shaft extend through the main hub and the motor adapter to mechanically connect the motor with the power feed auger.

13. The automatic feeding device of claim **11**, further comprising:

a main pipe cap disposed on a distal end of the main pipe; and

an end shaft connecting the main pipe cap with the power feed auger.

14. The automatic feeding device of claim **11**, further comprising a second tee disposed at a distal end of the pipe, wherein the orthogonal connection point of the second tee provides a food pellet dispensing hole, releasing food out of the automatic feeding device during operation thereof.

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